

BATHS AND WELLS

OF EUROPE

MINERAL WATERS

SEASIDE AND MOUNTAIN RESORTS

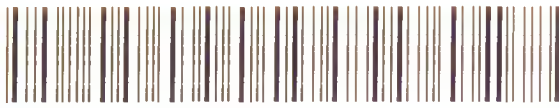
CURATIVE USES OF WATER

MILK AND GRAPE CURES

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THE
BATHS AND WELLS OF EUROPE.



THE
BATHS AND WELLS
OF EUROPE;

THEIR ACTION AND USES.

WITH

NOTICES OF CLIMATIC RESORTS AND DIET CURES.

BY

JOHN MACPHERSON, M.D.
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"Ample, most ample, is the Pharmacopœia of Nature."—PARACELSUS.

WITH A MAP.

SECOND EDITION, REVISED AND ENLARGED.

London:
MACMILLAN AND CO.

1873.

LONDON :
R. CLAY, SONS, AND TAYLOR, PRINTERS,
BREAD STREET HILL.

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PREFACE TO THE SECOND EDITION.

My thanks are due to the English press and to the public generally for the favourable way in which this book has been received ; and still more to the German press, whose praise is the more valuable, as the subject of mineral waters is better understood in Germany than in England. If the work differed from other English ones of the same nature in any respect, it was in giving a more concise yet more comprehensive view of natural curative agencies.

Its object has been better explained by Dr. W. Black, in his *Historical Sketch* in 1782, than in any words of which I can make use. "A medical work, comprehending a concise analysis and narrative of the most renowned medicinal springs in Europe in the cure of disease, would be an useful production. . . . Whoever engages in a review of these publications, must carefully separate truth from fable : he must scrupulously scrutinize the authority of the materials ; he may also

venture to lop off a farrago of theoretical bombast, chemical trash, trivial records, and a thousand superfluities. His work might be termed a pharmacopœia of some of the most agreeable and powerful remedies spontaneously prepared by nature for the benefit of man."

Such is the design I have endeavoured to carry out, supporting it by visits during a series of years to almost every well-known bath. Respecting this new edition many friendly hints have been received.

1. It has been considered to be too short. But if the reader will have the kindness, after reading the account of any particular bath, to refer to the introduction to the chapter in which it occurs, and to examine the comparative tables of waters, he will find that the book is not so very brief or superficial, as some have thought it. All large books on baths are swelled out with endless repetitions (a fault which this one does not profess to have escaped), and with long lists of chemical analyses. Though the character of the book is not altered, still this edition is fuller than the last in the chapters on Climatic Resorts, on the Iron and Alkaline Baths, and in the accounts of some of the more popular watering-places. The chemical tables have all been compiled by me afresh.

2. Some medical friends have wished, that the indications for the use of the waters should be more precise. The precision they demand, is, I believe scarcely attainable, but I have so far complied with their desire, by adding a Synopsis of diseases and of the places where they are usually treated. This Synopsis is imperfect, and, if not used carefully, may mislead; at all watering-places stories are current of mistakes made, even by leading physicians and surgeons, in the selection of baths for their patients.

3. The doctors of particular baths, and patients who have benefited by them, conceive that sufficient praise has not been bestowed on their favourites. But there is an ample supply of local works each sounding the fame of its Diana; and as my object has been to be critical and impartial, no change has been made in this respect.

4. The advice received most commonly, both from medical and from other friends, has been to popularize the work, and make it more of a guide-book; to give full accounts of routes and inns, of establishments and their expense; and to give lists of the doctors most known to the English at the different spas.

As to popularizing the book, I hope that the arrangement of the matter is simplified in this edition. As

to the second suggestion, after much consideration I have found myself unable to adopt it, both because to give such information would be going beyond the design of the work, and because the book could not compete with any chance of success with Murray's, Baedeker's, Joanne's, and other handbooks. Judging by the reception of the first edition, this manual, such as it is, seems to have been found by English and American travellers, a useful medical supplement to their regular guide-books. It notices most places that they are likely to resort to.

35, CURZON STREET, MAYFAIR,

March 12, 1873.

PREFACE TO THE FIRST EDITION.

To prevent misconception, it may be well to say that this work does not profess to be a guide-book to spas, although it is intended to supply information which will afford aid in the selection of such of them as are suited for particular cases.

To save the reader the trouble of constant reference to larger maps, an outline one has been prepared, on a small scale, which may serve to point out the general position of places.

CURZON STREET, MAYFAIR,

April 23, 1869.



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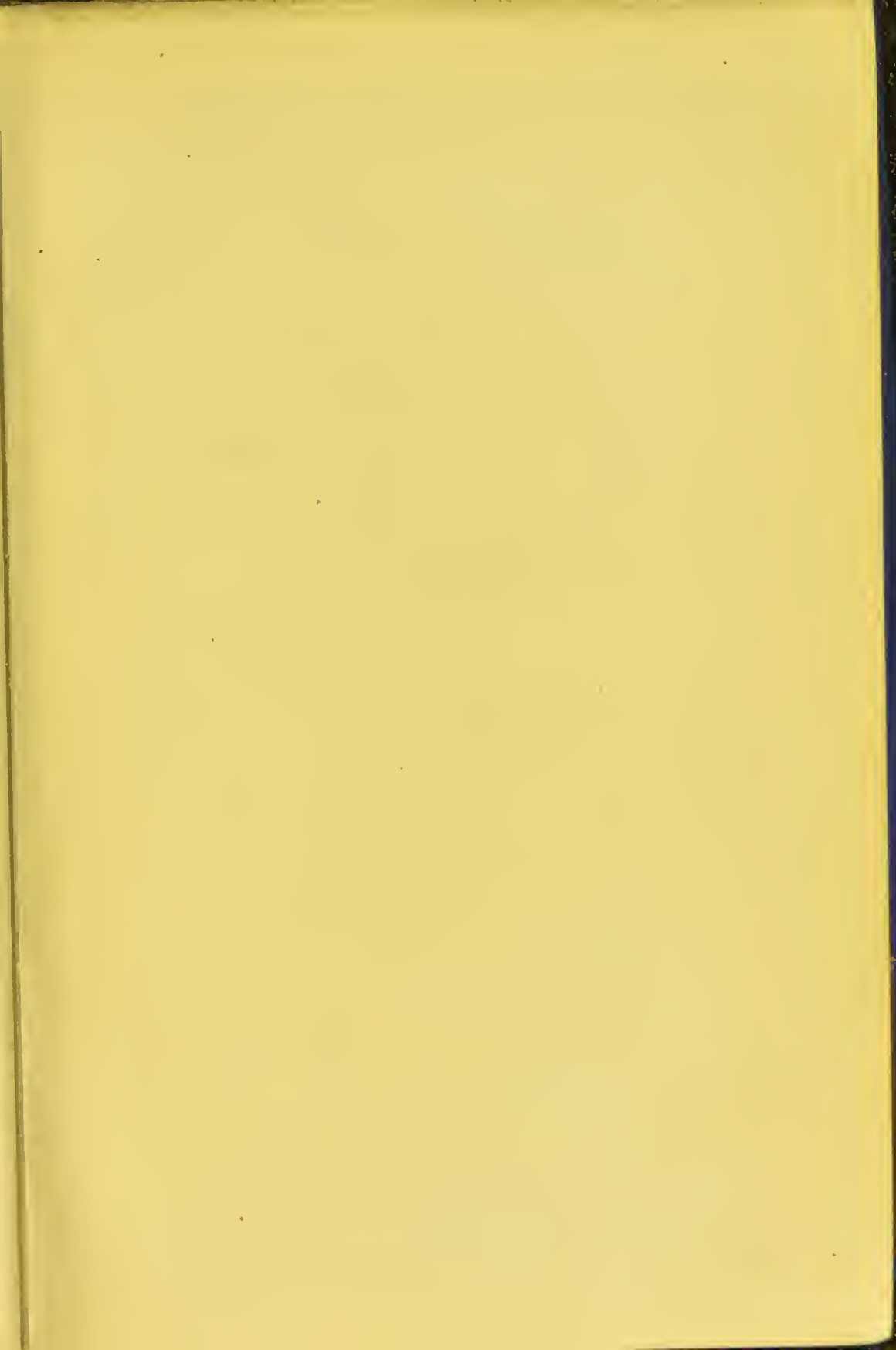
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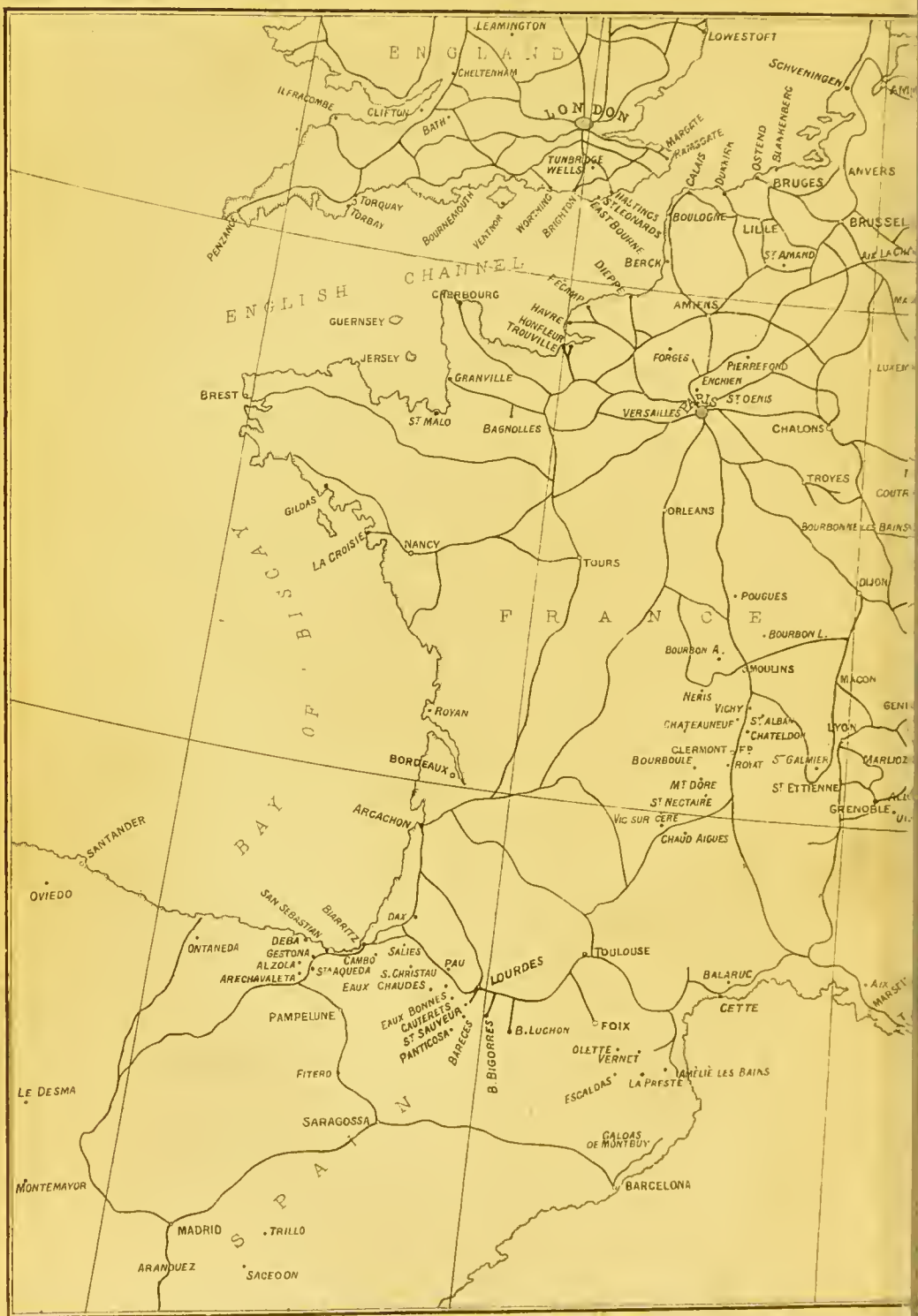
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SKETCH MAP OF
PRINCIPAL BATHS
AND
PLACES OF HEALTH RESORT,
CHIEF TOWNS MARKED. . . .



NOTE.

THE amount of the mineral and of the gaseous constituents of mineral waters is, in accordance with the now almost universal continental practice, given in decimals. The parts by weight in 10,000 are given.

The comparative tables of the constituents of the waters are accurate enough for practical purposes. There are some inaccuracies, owing to carbonates and bicarbonates not being always sufficiently distinguished, nor anhydrous salts from those containing their water of crystallization, but this is not of much importance.

Such readers as may wish to know the amount of the contents in pints, may obtain readily a rough approximation to it by, in the case of solids, deducting not quite one-third, and in the case of carbonic acid, adding about one-fourth.

For instance :—

61 parts of solids in the 10,000 = about 44·7 grs. in the pint.

31·9 parts of carbonic acid gas in the 10,000 = about 41·7 cubic inches in the pint.



THE
BATHS AND WELLS OF EUROPE.

INTRODUCTION.

THERE are few people, certainly very few women, who are not more or less doctors. It is not merely that they have some general notions as to what should be done in case of sickness, but that they have distinct medical opinions and theories of their own. Half-knowledge and a certain degree of mystery are always captivating to the human mind. It is delightful to take a galvanic bath, and have the mercury and other poisons which have ruined your system, exhibited to you, as they are mechanically eliminated by electric action—nay, some years ago a certain nobleman gave it in evidence and apparently rather to his own satisfaction, that a substance resembling lead had been extracted from his head by metallic tractors. So, a lady who would not dream of wearing an amulet will use a galvanic ring, as she can quite understand being cured by galvanism ; and she thinks much more highly

of her corn-doctor, when he tells her that her corns are caused by her system throwing out the gout. What can be simpler than the theory of such cases? Or take another instance : a mother is induced to give her child, who is suffering from a paroxysm of fever, a few drops at night of a medicine which she is told is endued with marvellous powers. She watches the operation of the drops, the fever gets less towards morning, and she is a firm convert to globulism. What can be clearer than that the drops cured the fever? that they were not ordinary drops of ordinary practitioners? She has given a practical trial to the system, and doubtless, under the instructions of friends, had previously mastered a theory which to the laity always appears so simple and intelligible. A scrap of theory, for instance the announcement that it is a purifier of the blood, wonderfully helps the sale of a quack medicine. Whoever uses such a medicine fancies that he understands exactly how he is cured by it. A patient in the play of Molière does not comprehend what the doctor is saying about his case, until he gives this explanation : “*Je veux dire, qu’il y a quantité d’humeurs corrompues dans votre corps ;*” on which the patient at once replies, “*Ah ! je vous entends.*”

Mystery, or faith, is the next influence in subjection to which the patient places himself. A hundred years ago, a writer on mineral waters observed : “The public is ever captivated with novelty, and ever reveres things seeming secret and mysterious.” It is wonderful to what an extent our faith is drawn on by the various forms of marvel cures, and it is therefore not very surprising that those who adopt

them are often those who evince an extreme readiness of belief on other subjects, just as those who experience miraculous cures from her exported waters, are those who have most faith in the Virgin of Lourdes ; but it is strange that a practice like that of globulism should have arisen amidst the scepticism of Germany, and that many who are most critical in matters of religion and of philosophy accept readily, after little or no examination, the latest novelties in the way of wonderful remedies : partly because they have never thought much on the subject ; partly, no doubt, from their fondness for deviating from everything that is old and established. Curious that the extremes of belief and of unbelief should meet in the ready acceptance of marvels ! A French *savant* cures an ague by placing a piece of camphor on the pit of the stomach ; or an Indian medicine-man, clothed in mystery garb, dances round the patient until he has driven away the fever ; or an invalid enters a quiet establishment, where disease is cured by prayer under the superintendence of a pastor. In such cases faith is the secret of the occasional success of the remedy. And while man's mental constitution remains what it is, and while the problems of medical practice continue to be so complex as they are, a certain amount of this implicit faith will always be required in regular as well as irregular medicine. Although we have not in these days got professed witches, unless we accept mesmeric mediums as their representatives, there is no question that the remark of our greatest philosopher is practically true to this day. " In all times, in the opinion of the multitude, witches and old women and impostors have

had a competition with physicians." To a great many minds, faith in some one else is absolutely necessary ; and many patients are much happier when they have erected their doctor into a medical high priest, and they look to him for marvellous cures. Viewing the relation of a large class of patients to their physicians in this light ; knowing that the great mass of those, especially of English, who resort to baths are not seriously ill, at least that their ailments are not acute ones, in which imagination can play a comparatively small part ; and knowing the craving of the public for novelty and for wonders, it is not surprising, however much it may be a subject for regret, that in many instances the bath doctors, who themselves generally believe that their waters have properties beyond those detected by ordinary chemistry, over-praise their waters, proclaim each to be a panacea, and even invent novelties in treatment in order to keep up the interest of their patients.

It seems also to be impossible to bring a new mineral water, or health station, even a good one, into notice, or to revive the credit of an old one, without a large amount of vulgar puffing.

Owing to their disapprobation of such practices, and their natural unwillingness to allow that certain effects may be produced more easily abroad than at home (for we have not very many wells of much importance), it is not surprising that in England there has been a tendency among many well-informed medical men to underrate the value of mineral waters. But we are not to give up a system on account of the unworthy acts of some of its professors. In fact, it would

be impossible to put a stop to the resort to bathing places. In German families of any means at all, it is the holiday of the year, which must be kept. And English find it not more expensive to visit a foreign spa, than to go to the seaside at home. . Since there is something so pleasing in the annual change from home ; since most of the waters drunk or bathed in are either pleasant, or after a time not disagreeable (always used more willingly than physic) ; and since the imagination is pleased to dwell upon their hidden virtues, visits to spas will always continue to be popular. In short, those who condemn mineral waters unfairly, would do better if they would study their use, and endeavour to explain the *rationale* of their operation. If it were possible, it would not be desirable to destroy faith in mineral waters ; they produce real enough cures, but the faith should be rendered intelligent.

To arrive, however, at a correct appreciation of all the elements concerned in the influence of mineral waters, is by no means so simple a matter as it might appear at first sight. Still, progress is being made in the solution of these questions. The Germans, although they can scarcely write a treatise on mineral waters without beginning *ab ovo*, and explaining the influence of Baco of Verulam (they will call him Baco) on the progress of natural science, have got rid of many old notions. It is no longer a matter of anxious inquiry, as it was some years ago, whether the patient had ever suffered from itch, whether the source of the malady was suppressed foot-sweat ; and then abdominal plethora or hæmorrhoidal dyscrasy are less insisted on. The French

though they still have faith in the mystical powers of waters, which they have termed animated medicines, and believe in a sort of diathesis, which they call the "dartrous," are getting emancipated ; the ordinary bath theory, of fever crises and eruptions being essential to cures, has been abandoned (not that such effects do not occur, not from the use of waters, but from their abuse). Then we hear less of the chemistry of nature, and of its being necessarily perfect.

The theory of the operation of waters in bathing is better understood. The elementary action of hot and of cold water has been better studied ; purely chemical theories, such as that of alkalization of the system by certain waters containing soda, or of curing scrofula or gout by waters that contain minute quantities of iodine or of lithia, are no longer counted sufficient. The notion that the heat of thermal waters differs from any other heat is abandoned ; even later theories of the operation of such waters, by heat being placed in certain peculiar dynamic states, or observations showing that there is a stronger current of electricity in mineral than in ordinary waters, afford no sufficient explanation, as our commonest actions involve electrical changes.

In short, in this as in other departments of medicine, we are less inclined to take things for granted, especially certain therapeutic actions, and the necessity for an analysis of the causation of the facts that come before us, is admitted by all. But many years of accurate observation will be required before satisfactory results are attained. These pages propose to exhibit a general view of the present condition of our knowledge on the subject, gathered in considerable measure

from personal observation, and partly from every available source of information. It is hoped that they will supply in a condensed shape an outline of all that is essential to be known on the subject of the baths and health-resorts of Europe. They are meant to furnish a sort of information, which is not readily to be found in any English work.

With reference to the object of this work, which makes no pretension to be a complete treatise on Balneology, it has been deemed unnecessary to include detailed chemical analyses of all the waters. They indeed often convey erroneous impressions to those who are not familiar with the subject. They will be found in the large manuals of Balneology, and the "*Dictionnaire des Eaux Minérales*," of which a later edition is much wanted. Enough has been said to show the general composition of most of the waters.

Although few baths that are much out of the track of the English on the Continent are noticed here, and therefore many in Sillesia, Hungary, Wallachia, and elsewhere are omitted, yet the number mentioned in this book, it is feared, is quite large enough to be somewhat embarrassing to some. While the stream of English to continental baths is increasing every year, and such wells as we have and our excellent sea-bathing places are not made use of so much as they should be, it seems a pity that the current should run so much in one direction, and that it is not turned into more channels. Undoubtedly, taken as a whole, the German baths are best managed, and best suited to the taste of English visitors. But many of the French ones leave nothing to be desired, and the recent war with Germany has created anew

in France a spirit of rivalry with the German baths, which, though it has been carried to a foolish extent, is at least tending to the improvement of the French establishments. If patients once begin to flock to a new place, it is wonderful how soon its arrangements are improved. Pretty full notice has been taken in these pages of some of the Italian and of the Spanish baths, particularly such of the latter as are not far distant from the English colony of Pau and the fashionable watering-place of Biarritz. While many of the Spanish and indeed of the numerous Portuguese baths are rising into importance, it is much to be regretted that the analyses and the accounts generally of these waters are very imperfect. Still, increased attention is paid to them ; fresh monographs are appearing ; and, besides Rubio's excellent book in 1853, a general work on the waters of Spain, by Don José de Antelo y Sanchez, is now appearing. In Italy, Garelli, Jervis, and Marieni have published valuable works ; and England is almost the only country that has of late contributed no work of much importance.

Helfts' "*Balneotherapie*," 1867, Kisch's "*Balneotherapie*," and Meyer-Ahrens's elaborate work on the Swiss baths, of the same year, have been of much use to me. But the works that I must acknowledge my special obligation to, and of which I have made the freest use, are Braun's "*Lehrbuch*," 1868, written in a critical spirit of examination, and Lersch's "*Praktische Lehrbuch*," like all the other works of that distinguished Balneologist of Aix-la-Chapelle, a perfect mine of information, and rivalling the elaborate work for the earlier history of Balneology of the Roman physician

Andreas Bacci. I have consulted Constantine James's lively guide, Joanne's "Bains d'Europe," and Dr. Gsell-Fell's "Sud Frankreich" with advantage, and also an infinite number of French, German, Italian, and English local guide-books and monographs. I am indebted to Dr. Robert Velten, of Wiesbaden, and to his late father, for many useful hints.

Slight though its execution may appear to be, I find that the task I have attempted is a less easy one than I anticipated, and the words of Paracelsus, which appeared to me at first to be extravagant, no longer seem so: "The knowledge of such baths is especially worthy of the physician, for in it are comprehended not only the whole of medicine, but also the principles of all the natural sciences with which a physician should be acquainted." While I have felt the difficulty of reaching such a standard, I have often been tempted to contrast it with the unhesitating confidence of many a physician; "*qui ne voit rien d'obscur dans la médecine, rien de douteux, rien de difficile.*"

BOOK I.

ELEMENTS OF TREATMENT.

CHAPTER I.

BATH LIFE.

WHEN we come to analyse the benefits obtained from a visit to one of the many places resorted to in the search for health, we find that they are not the result of any one single, but of many co-operating causes.

Take Trousseau and Pidoux's description of a fine Paris lady, written by the way more in the style of a French novelist than of staid practitioners : she is represented "as living in the midst of luxury, not getting up till mid-day, confining herself during most of the afternoon to a perfumed room, which the light scarcely penetrates, taking a drive in a close carriage when the weather is fine enough, living on made dishes, which are made the more piquant as her appetite grows more fantastic ; next she is influenced by her passions, good or bad, her disposition, sad or gay, her social

and family duties, the routine of every-day little annoyances, and finally by *ennui*, that pest of idleness and of riches. Her appetite fails, her digestion is languid, her nervous system is exalted ; she gives an endless deal of trouble to her doctor, who can do little for her, and who in despair sends her to some spa. There her habits are changed in every way : she has to get up early in the morning for her waters, or her bath ; she leads a comparatively simple life in the open air ; and without going into further details as to her changed mode of life, can you wonder if she returns to Paris cured ? ”

A well-known English author, Dr. Beale, expresses himself thus : “ If patients could be induced to retire to a pleasant part of the country, where they would take moderate exercise, and be free from mental anxiety, meet with agreeable society, live regularly, take small doses of alkalies, and bathe themselves for an hour or two a day in warm water, in which some carbonate of soda has been dissolved, they would receive as great benefit as by travelling hundreds of miles away, and at much less trouble and expense.” Here the whole question is begged. Is it so easy to find, just when you want it, a pleasant spot in a picturesque district, with agreeable society, and all the conveniences for bathing ready to your hand ; and would they be less expensive ? Even in the case of hydropathy, the appliances of which are so easily procured, who thinks of going through a regular course of it in his own house, or in an establishment in the town where he lives ? If he does not go as far as Malvern, or Yorkshire, or the Rhine, he at least leaves London, or any large city in

which he may be, and retires to its neighbourhood ; and when he does so, a portion of the benefit he may obtain is to be set down to the amusement he receives from the society he meets in the establishment, and from the regulations of such institutions.

The first of the advantages of leaving home is that of travelling : on its pleasures I need not expatiate ; but those who travel in fine weather, and in comfort, are commonly in high spirits, and they fall in with others who are, with the exception of a few habitual grumblers, always cheerful. Montaigne said well, "He who does not bring along with him so much cheerfulness as to enjoy the pleasure of the company he will there meet, and the walks and exercise to which the beauties of most baths invite us, will doubtless lose the best and surest part of their effect." This social relaxation is as much required by the hard-worked office man, who goes through his routine work almost mechanically, as by the man of letters, or by the statesman, whose loftier pursuits and objects put a strain on the higher mental powers. It is good for us all to get out of our groove for a time. In travelling, alterations of habit are enforced ; a certain irregularity of hours of rising and of going to bed takes the place of our fixed ways. There is necessarily a change of diet, and of hours for taking meals ; the routine of daily life is interrupted.

When his journey is once over—when a patient is settled at a bath—the uniformity of home habits continues to be broken ; a special diet is usually enjoined, and sometimes adopted. Patients will often obey implicitly the directions

they receive when away from home, who turn a deaf ear to the judicious, but as they think routine, advice of their home attendant. What does not by its novelty arrest the imagination is apt to be treated with indifference. For a long time certain absolute rules of diet were laid down for patients while drinking waters. Butter, and coffee, and tea, and many innocent articles, were proscribed. A doctor who allowed the use of butter was set down as an ignoramus, just as an Oriental would have no opinion of one who ordered him a hot article of diet, when the patient considered that a cold one was suitable for his complaint. Long lists were paraded, and are still used in some places, pointing out what things may be eaten, and what are to be avoided. Many patients like having such positive injunctions. General principles alone can be enunciated at a distance; those special instructions must be given on the spot, and should vary according to the condition of the patient. The general rule is to confine oneself to eating light digestible food. No one while at home, using laxative medicine, or indeed counting himself ill, would think of eating pork, pickles, salads, fruit, red herrings; and every prudent man will avoid such things when drinking mineral waters, and also learn from his physician whether there are any special precautions to be taken while using the waters of a particular spring. At one time bathing and drinking were proscribed to women at certain periods and in certain conditions, but that rule has been very properly relaxed somewhat.

The routine of bath life, already so familiar to most English readers, scarcely requires to be described. The waters

are drunk mainly, perhaps too exclusively, between half-past six and half-past eight in the morning ; a glass of water, on an average perhaps of six to eight oz., is drunk. Many patients drink their water diluted with milk or whey, and ladies often suck it through glass tubes ; but in the great majority of instances these practices are unnecessary. The patient then walks up and down shaded alleys or covered ways with his friends—and in many new baths the want of sufficient shade is a great drawback—and repeats his draughts at intervals of about twenty minutes, until he has taken his supply ; then goes home to a light breakfast. There are some few people with such an inveterate dislike to early rising that they must be allowed to drink the waters in their homes at first. But an effort should be made to induce them to get up early, unless there be some very strong reason to the contrary. There is no objection to their taking a small cup of coffee, or of tea, before they go out of doors. When baths as well as drinking waters are used, the drinking precedes the bathing ; most people who rise early get their bath over before breakfast. But those who do not rise early, or who are not strong, put the bath off till after breakfast. The bath of course should be over before any heavy meal is taken. At some baths the drinking is the important business of the day, and the bathing is a secondary matter. In others this is reversed.

In France you are usually supplied with two abundant meals,—one the *déjeuner* about ten in the morning, the other a dinner about five o'clock. In Germany, on the contrary, the one great meal is taken by the visitors chiefly about one

o'clock, and there is a later and more expensive meal about five o'clock, mostly frequented by English and French. On the whole the cooking is better and the ordinary wine sounder in France than in Germany. I am satisfied, from what I have seen, that patients eat a great deal too much at these *table-d'hôte* dinners. In some places, such as Karlsbad, the dinner-supplies (there is no *table d'hôte*) are, to a certain extent, under the control of the medical men. While eating too richly and in too great variety is the danger of the *table d'hôte*, the advantage of it is, that meeting the amazing variety of people seen at it, is useful to nervous and hypochondriacal, and to many dyspeptic patients. The well doctor should be asked in each particular case, whether it is better to go to a *table d'hôte*, or to dine at home. One matter of great importance to many English travellers, with whom the wines of the country often disagree, is that they should find out at once some good sound wine which they can drink without the risk of being incommoded by it.¹ An hour after dinner they go, in some places, and drink any mild acidulous water that the place supplies. The chief amusements are bands of music during the morning and evening, balls on certain evenings of the week, concerts, and theatres, for in all the principal spas there are handsome public rooms, comprising magnificent ball-rooms and dining-rooms, theatre or concert-room, and reading-rooms. Excursions to places of interest in the neighbourhood help to fill up

¹ Weak brandy and water or Marsala are a great resource for those who are not accustomed to light sourish and Swiss wines. But good Marsala is often not to be had. Veltliner is always safer than the Swiss wines.

the time agreeably, and, if they are judiciously managed, the exercise and the change of air which they involve, contribute to the cure.

These are the legitimate amusements, but at a great many spas, and those most frequented by the English, gambling was a great attraction, especially at Spa, Baden-Baden, Wiesbaden, and above all at Homburg. The gambling tables have now been closed, and the English must manage to amuse themselves without their help. At present nothing is commoner than to hear the English complain of the intolerable dullness of Kissingen, or of Schwalbach, although the scenery is pleasant, and cheerful company is always to be had at these places. It will be curious to see how a place like Homburg will stand the test of the loss of its tables. Pleasant places though fashionable watering-places be, they are undoubtedly, and have in all ages been, full of vice of all kinds,¹ and were consequently forbidden to the clergy, except under circumstances of necessity, by Gregory the Great ; and it can only be in the hope of working a reformation where it is so much wanted, that personages of most special gravity and reverence, with many watering-places of equal salubriousness open to them, are led to resort to those noted for their dissipation.

The advice which an invalid will receive as to the bath he should visit, will vary according to the place in which he asks for it. For instance, it will be different in Paris, in

¹ It is amusing to read how in former times such penalties as public whippings at the four corners of the baths were employed at Plombières to deter improper persons. Much curious information about bath life may be found in Montaigne's "Travels," in the "Amusements of Aix-la-Chapelle," in Lersch's "History of Baths," and in an article in the *Quarterly Review* of July 1870.

Frankfort, and in Vienna. Yet the advice may be excellent. All consulting physicians naturally recommend the watering-places which they know best. The selection of the particular bath to send a patient to, must be regulated by a variety of circumstances. The first, but by no means the only consideration, is the nature of his malady ; next, whether you are selecting a place for the patient alone, or whether a place is required that may at the same time suit some members of his family, or some friends that may accompany him. Is the patient one who requires repose and quiet, or does he stand in need of pleasant society ? Then comes the question of expense and of distance. It is usually more convenient to select a place not very remote or difficult of access, although this is not always the case. Then, are the patients fastidious as to diet, and in other respects ?¹ Do they require, or is it wise, that they should have the stimulus of excitement ? Is the climate of the place very important for the particular case ? The climate in reality depends much less on the latitude of the place, on slight elevation above the sea, or on its absolute temperature as shown by the thermometer, than on its being sheltered or not from the prevailing winds, and having shady alleys near the wells, and paths through the forests with

¹ My own feeling is that the English, generally speaking, are over-fastidious, and require too much. I believe that in many cases they would be all the better for roughing it a little at some of the smaller spas, if only the appliances in them for meeting the one daily-recurring necessity were improved. The simple truth is, that defective arrangements in this respect interfere most materially with the health and comfort of those who are accustomed to better ones. In 1872 I observed a great improvement in this respect in France. I have heard Germans complain of "*Echt Französische Schweinerei*." But such swinishness is not confined to France.

resting-places in the vicinity. Are the arrangements of the particular bath good? If the place is overcrowded, the difficulty of procuring a bath, and the necessity of going at 3 A.M. to take one, may do away with half the benefit expected from it.

Some light is thrown on these subjects by ascertaining how many visitors resort to particular baths ; because the larger a place is, the greater is the number of those who go there merely for amusement, and *vice versâ*. But it is not very easy to arrive at accurate statistics. This statement from Ischl well illustrates the difficulty. In the year 1867 Ischl was visited by 5,795 parties of strangers, while the number of parties that entered themselves for treatment was 1,199, which represented 3,100 individuals. Again, in 1868 the number of strangers visiting Aix-la-Chapelle was over 10,000, while those who underwent treatment were between 3,000 and 4,000. In the case of Baden-Baden it is pretty certain that not more than 6 per cent. of its numerous visitors make use of its waters.

The following calculations will, however, give some general ideas on the subject of the more crowded ones :—

BELGIUM	Spa	18,000
	Baden-Baden	50,000
	Wiesbaden	30,000
	Schwalbach	5,500
GERMANY	Homburg	12,000
	Baden (Vienna)	9,000
	Kissingen	7,000
	Gastein	3,000
	Carlsbad	14,000
	Marienbad	6,500
BOHEMIA	Franzensbad	5,500
	Elster	2,500
	Teplitz	22,000

SWITZERLAND . . .	Baden	20,000
	Bagnères de Luchon	19,000
	Bagnères de Bigorres	18,000
PYRENEES	Eaux-Bonnes	9,500
	Cauterets	8,000
	Ax	2,500
	Aix	6,000
FRANCE	Uriage	5,000
	Vichy	23,000

We thus find that the principal baths alone, some twenty-five out of the three or four hundred considerable baths in Europe, have a resort of at least 300,000 individuals.

A great deal of the success of a visit to a spa depends on the patient going willingly, having friends with him, going to a cheerful place, being fortunate in his weather (although Lersch says he hears of most cures in wet seasons). More depends on such matters than we are perhaps apt to think. If a patient has taken a dislike to a particular spa during one year's experience of it, although this may have been merely the result of accident or caprice, it is far better to select a new place for him, than to force him back to a spa he dislikes. Patients, again, who have extravagant faith in the virtues of a spa they have already tried, should not be rashly dissuaded from returning to it, for confidence is always an important element of cure under all modes of treatment.

No patient ought to go to a bath without a statement of his case from his usual medical attendant. With the aid of a statement the bath physician is in a much better position for prescribing a suitable course of treatment, than if he has first to make out the whole history of the case, which it may take

him some time to do. No one should attempt to enter upon bath treatment without consulting one of the doctors of the place. There may be peculiar usages and practices at the particular bath, the use of which may not at first sight be apparent. But the bath doctors have practical knowledge of the operation of their waters. And all men of practical experience know the use of the weapons they are in the habit of wielding, better than strangers do, although they may at the same time overvalue them. There are in fact many waters of undoubted value, where the good arrangements of the station and the experience of the medical staff make up for what they want in mineral strength. There has indeed often been something of accident in the way in which the treatment of certain maladies has been originally taken up at certain places. There are differences in the application of particular waters to particular cases, a knowledge of which can only be partially explained on general principles, and which is attained chiefly by empirical practice. One whom it is usual to class among quacks, Paracelsus, wrote more than three centuries ago with so much practical sense on the whole subject, that I must quote the substance of what he says. After explaining that a bath physician should be thoroughly acquainted with his profession, and that the virtues of wells are best tested by the cures they produce,—for daily experience is worth more than the counsel of books,—he says that the physician should regulate the diet of his patient according to the nature of his malady, and that a physician in sending a patient to a watering-place should judge and discriminate in what cir-

cumstances he is more or less fitted for a course of waters, and whether it is a fitting time to send him. For if these things are neglected, patients are misled, and the operation of natural thermal waters falls into disrepute.

It is a very general notion that baths and mineral waters, if they do you no good, at least can do you no harm; and this seems to have been the opinion of Montaigne—but he only used the indifferent, or nearly indifferent, waters of Plombières, Baden in Switzerland, and Lucca. Not that even they can be used indiscriminately. It is quite a mistake: many of the waters are very powerful medicinal agents, and may prove most injurious, if carelessly employed. They have often caused death.

It was formerly the practice, that patients should undergo a preparatory course of treatment. Boileau wrote a deplorable account of himself to Racine: "I have been purged and bled, and have not failed to comply with all the formalities required before commencing the use of the waters. The medicine which I have taken to-day has, as they pleasantly say, done me all the good in the world, for it has made me faint four or five times, and rendered me so weak that I can scarcely stand." These lengths are not gone to now, and the less done, except to allow the traveller to rest for a day or two before commencing his course, the better. Then the length of a cure has been usually fixed at twenty-one days, particularly in the use of baths; any such period is purely arbitrary; in regular medicine no one defines the period required for cure, especially in a case of chronic disease. Paracelsus, to quote him once more, said that no certain

and precise number of baths could be fixed on. Everything depends on the kind of baths or waters used, on the nature of the malady treated, and on the individual peculiarity of the case, the patient's constitution, or on other circumstances, such as the time that he can afford to spend. The great rule is not to hurry the cure ; to spend as much time on it as possible ; to take the waters first in small quantities. Small quantities taken over a protracted period do not produce the disagreeable effects of over-dosing, and they affect the constitution more favourably and lastingly. Over-bathing, remaining too long in the bath, or bathing more than once a day, are practices to be avoided.

Systematic rules about what are called after-cures, have frequently been laid down. It is often useful, particularly in certain classes of disease, to continue at home for some time the use of the waters which have been drunk at a spa, especially if they be of a class that does not suffer much when bottled and carried ; or it may be expedient, after a lowering course of treatment at one well, to send a patient to another source with bracing properties ; a familiar instance of this is sending patients to iron waters after a course of saline treatment, or it may be well to send him to an Alpine climate, or merely to travel. In many instances where patients have not benefited as much as was expected, they are dismissed to their homes with the assurance that they will feel the benefit of their bath course afterwards : and patients do very often feel better after a time. But if a favourable change does take place, it is by no means plain that the waters should always get the credit of it. It is better to admit that waters,

like all other remedies, fail at times to be of use. But it is often difficult to form a dispassionate judgment on those matters. For instance, of two patients who were lately at Aix and Vichy respectively, the one thought himself very little better while under treatment, but was better the next winter than for a long time. The other benefited much at the time, but shortly after his return home had an attack of disorder of the kidneys, which was attributed to the system being saturated with the alkalies of the Vichy waters.

With regard to expense, it is difficult to say much. The most fashionable baths are naturally the most expensive ; but even at them there are ways of living economically, though perhaps not found out immediately by English not accustomed to foreign life. Many of the smaller baths are very cheap places of residence ; and altogether living, even at the best hotels, is considerably cheaper than in second-rate ones in England, although it has been becoming of late years more expensive.

The various kinds of cases to be sent to particular kinds of baths are mentioned afterwards ; here it is not necessary to say more than that it is cases of chronic disease, which are but little influenced by ordinary medical treatment, that profit most by the use of mineral waters.

Some of these are—general anæmia and chlorosis, scrofulous and tropical cachexy, certain urinary, biliary, and skin complaints, dyspepsia and hypochondriasis, chronic rheumatism and gout and thickened joints, many nervous affections, and some forms of paralysis. Bronchitic affections may be frequently benefited ; women suffering from various functional

derangements often gain much ; but ladies must not implicitly believe all the wonderful stories they are told of the dispersion of ovarian and of other tumours. If they do so, they will assuredly be disappointed.

An objection which has been taken against bath cures may be noticed here. It has been said that the effects are not permanent—that one visit to a bath always leads to a second. But this is no real objection. There are few chronic complaints that can be permanently cured in a month or six weeks, so as to make their recurrence unlikely, by any mode of treatment ; and his return to a bath shows that the patient thinks he has benefited by it, or that he likes it. On the same grounds the climate of the Himalayas might be found fault with. In India, all classes, from the Governor-General downwards, prefer spending certain portions of the year away from the plains ; and it is notorious that if an officer once sends his family to the hills, he has to do so every year. But the Himalayas or the Neilgherries are not less valuable health-resorts on that account.

CHAPTER II.

MOUNTAIN AIR, SUMMER RESORTS, AND COMPRESSED AIR.

CHANGE of air is one of the most favourable influences, under which a patient places himself in leaving home. There is something in the feeling of change of air that is readily perceived, but not so easily described or explained. The mere change in the physical qualities of the air inhaled is too slight, to afford a satisfactory explanation. Perhaps the best illustration of the sensation is the intense feeling of delight and refreshment, which a patient derives from his first drive into the country after a severe illness, or which those who delight in it receive from the first sniff of sea-air. I have never myself experienced any change of air so wonderfully exhilarating, as that from the furnace blasts of the plains of India to the cool air of the mountains, to the odour of pine forests, and to the rippling of mountain streamlets. Existence down below and up above was existence in different worlds. In a case like this the main physical and tangible causes of these agreeable sensations, the change in the temperature and in the freshness of the air, are plain enough ; but it is by no means always easy to explain, not only why change of air is,

especially in the tropics, one of our most active curative agencies, why any change of air is agreeable to most people, but how the air of particular places seems to suit the requirements of particular individuals, how so many make up their minds that the air of some places agrees with them and that of others disagrees with them ; and this not merely in the case of such seemingly capricious diseases as asthma. It would be convenient if we could believe with many of our patients, and as they may have been rather heedlessly told by their medical men, that a place suits them owing to the quantity of ozone, or of iodine, or of iron, or of electricity in the air, earth, or water of the place, as it may be ; not that there is any question that certain conditions of soil and climate have a very positive influence on health. Patients are very naturally anxious to have a reason assigned for their feeling well or ill ; and if a patient once takes up a notion about his own constitution or the climate of a place, it is wonderful with what pertinacity he adheres to it. Although, however, we cannot entirely explain the cause of the difference in the effects in the air of different places, yet some of the general phenomena of different kinds of air have been tolerably well ascertained.

One of the advantages in point of air gained by going to visit a spa, is that you usually visit it at its best season. If you are in the North of Europe, you go south to enjoy the milder climate of Central Europe ; if you are in Italy or in the south, you go north to avoid the extreme heat. If in going in quest of health you have good weather, you have one great element in your favour ; but you cannot secure it.

The climate of baths is, owing to their situation, apt to be variable. If there is rain, it is damp and cold in a narrow valley : again, if there is bright sunshine, it is oppressively hot. It may be well to remember that in most parts of Germany June is the rainiest of the summer months. The bath season usually extends from the beginning of June to the end of September ;¹ but some of the Pyrenean or Spanish baths, where they have two bath seasons, also Aix in Savoy, and certain of the Italian ones, may be visited earlier ; and some of these, such as Ischia, may be used the whole year round. There are obvious reasons why spas cannot be so conveniently visited in winter as in summer ; but many baths may be easily used throughout the year with advantage, if patients will live in winter in the houses that contain their baths, as for instance Baden-Baden, Wiesbaden, Vichy, Bath. The great value of fine weather to a patient consists in his being able to be constantly in the open air, and this ensures both a certain amount of exercise and of exposure to light. In England we scarcely appreciate the advantages of light sufficiently. But besides the fine season there are two other important changes of air often met with by going to watering-places—the change to mountain and sea air. These subjects can be only very lightly touched on here—to do more it would be necessary to write a treatise on climate ; but it is necessary to glance at them in their general relations to our subject.

¹ On one occasion, going to visit a bath on the 15th September, the official date for its closing, I met most of the bath guests and their two doctors coming away in carriages. All the postal arrangements I found ceased on that day.

The chief characteristic of mountain air, besides its being cooler than the air of the plains, is its lightness, from the great diminution of atmospheric pressure at high altitudes. In the mountains there are greater and more sudden changes of barometric pressure than in the plains, more rain and wind, although in the very highest ranges the quantity of rain is not so great as in the lower ones ; on the whole, there is more alternation of movement and of repose in the air ; the air is renewed more frequently than in the valleys. There is more electricity above than below. Meteorologists consider that the upper regions of the air must be both absolutely and relatively drier ; yet the relative humidity does not seem to diminish with the height. Observations differ as made on elevated plateaux and on detached peaks. Like all country air, mountain air contains fewer organic or other impurities than that of towns. There is according to Dr. Angus Smith's researches a maximum presence of oxygen, and the air contains a little more carbonic acid on the top of mountains than at the sea-side. It has been suggested that this is owing to the want of vegetation, which might absorb it. There is increased light and greater sun radiation ; as the soil is more easily heated during the day, so is it more readily cooled at night. On the whole, the daily and yearly range of temperature is more regular and less extreme above than in the plains.

But the qualities of mountain climates do not depend simply on elevation. Places in the Alps like Montreux have been considered to have an Alpine climate, though only 1,100 feet above the sea. Alpine climates are subject to

many local influences ; for instance, valleys of the same elevation as plateaux or spurs of mountains, vary much more in temperature than the latter. The position of a hill giving shelter from the north, the opening of one valley into another, or the bendings of a valley, all influence the local climate. Spurs of mountains are colder than valleys when they are exposed to the north, warmer if they face the south, east, or west. Isolated mountains have less variation of temperature than plains. The neighbourhood of glaciers, snowfields, lakes, and even of cultivated land, lowers the temperature of a place. The number of hours a mountain valley is shone on by the sun influences its temperature much. Valleys are in winter colder, in summer warmer, than the mountains. It is a common notion that electrical phenomena are very violent in mountains, but this is mainly owing to the reverberation of sound among them. But enough has been said to show that mere meteorological tests, even when carefully applied, can show but very imperfectly what a mountain climate really is. Its effect on the system must be gathered from observation.

Travellers, possibly Aristotle first in giving an account of Mount Olympus, have often described certain effects of the air at great elevations, such as accelerated action of the heart, and bleeding at the nose or ears ;¹ and I am aware

¹ These more violent symptoms have usually occurred in those who have exhausted themselves in the ascent of mountains (violent headache and sickness sometimes follow a descent from a great height). It seems scarcely fair to attribute them to the rarefaction of the air, when we find that observers in balloons at the height of 23,000 feet, from whom a half atmosphere's pressure was taken off, experienced only acceleration of pulse and of respiration. When

that giddiness and headache and incapacity for exertion have been said to be met with in Europe at 5,000 and even as low as 2,000 feet. No such unpleasant effects (nothing more than a little nervous excitement or sleeplessness at first) are experienced in India up to 8,000 feet, which heights the English fresh from the plains reach without the slightest inconvenience, and at which they have long lived comfortably in the Himalayas. Not even the highest places of health-resort in Europe reach that height.

Unfortunately little is known exactly of the operation of mountain air. Professor Pettenkofer has favoured me with these observations on its theory: "Rarefaction of the air and decrease of temperature stand in a sort of antagonism to each other in their operation. Rarefaction of the air develops the surface circulation, while the simultaneous

Glaisher rose to about 30,000 feet, and about two-thirds of an atmosphere's pressure was taken off, he suffered mainly from the effects of extreme cold; and going in the opposite direction, if we consider the case of divers, they can bear the most enormous pressure with no disturbance of their functions beyond a little singing in the ears. Divers using the latest French apparatus sustain at the bottom of the sea the pressure of a column of 120 feet, equal to five atmospheres; and they have absolutely worked, although it is not counted safe to do so, at 150 to 180 feet, or under a pressure of seven atmospheres. It is considered prudent to descend, and still more to ascend, gradually; otherwise there may be headache and singing in the ears. There have sometimes been paralysis and even fatal consequences from a rapid ascent. Bert's recent experiments are very curious. He found that if cats were placed under a pressure of eight atmospheres, they got paraplegia in ten minutes after they had been restored to the natural pressure. Softening of the spinal cord was discovered on killing them. As the St. Gothard, a height of nearly 8,000 feet, and the Stelvio, over 9,000, are usually crossed without any disagreeable feelings, we cannot expect the assumed effects of rarefied air to be often manifested at our most elevated European health-resorts, as St. Moritz, where only about one-sixth of an atmosphere is taken off. Once, however, tell a nervous patient that he is to experience unusual sensations, and he is sure to feel them.

diminution of temperature and increased cutaneous transpiration tend to repress it." He states that "the frequency of the pulse and of respiration cannot be very different, unless the degree of atmospheric pressure is very different. We breathe to take up a certain amount of oxygen, and to give out a certain amount of carbonic acid. The quantity taken in and given out depends much more on the quality of the blood, and on the change of tissue, than on the absolute quantity of air which an inspiration contains. It is proved, experimentally, to be an error to suppose that in an atmosphere containing more than the usual amount of oxygen, more oxygen is also taken up by the lungs."

It seems certain that the mountain air being thinner, less oxygen must be inhaled at each inspiration, unless the lungs take on an increased action, and that if the supply of oxygen is defective, there must be an expansion of the lung-cells to make up for it. The chief practical information that we have on the first point is that of Coindet in Mexico, who found at a height of 7,410 feet, that while the respiration was slightly more frequent, there was no alteration in the relation between the circulation and respiration. He found the absolute quantity of carbonic acid expired the same as in the plains, and this is supported by the analogy of Professor Frankland's interesting experiment, showing that the amount of combustion of a candle was almost the same on the summit of Mont Blanc as at its base. Armieux again, in the case of eighty-six men removed from the plains to Barèges, a height of 4,000 feet, satisfied himself that after a residence of four months the respirations were in-

creased by two, and the beats of the pulse reduced by four.¹

The observations of Armieux on the same persons at the same place would seem to confirm the second point. He found by careful examination that the eighty-six men had in four months gained on an average one inch in measure round their chests. It is generally believed that the chest is well developed in mountaineers ; but as many such, for instance those of these islands, live at a very small elevation above the sea, the expansion of their chests must be referable to their exercise in climbing hills, and not to diminished atmospheric pressure.

The general view of the subject is this, that change to the mountains retards oxidation, *i.e.* animal waste, and is therefore conservative ; also that changes of barometric pressure and of moisture of the atmosphere are beneficial in giving the system alternate periods of excitement and of rest. But on all these subjects there is little positively known. Though some sensitive organizations are undoubtedly affected by every change of barometric pressure, or by what it represents, the generality of men either are influenced in no palpable way by it, or immediately accommodate themselves to it.

The immediate effects on the system of a change from the plains to a considerable elevation, so far as they are ascertained, are believed to be these : that the surface veins

¹ He has arrived at the conclusion that residence at great heights disturbs the normal relation between the number of inspirations and the frequency of the pulse, and thus, inducing sluggishness of the heart, gives rise to congestion of the lungs, and a diminished supply of blood to the brain and nervous centres.

contain more and the arteries less blood than under ordinary circumstances. The inspirations are more frequent and shorter, and therefore not so deep. The pulse gets quicker, but is feebler. There appears to be increased elasticity of the lungs, and it has been presumed that there is increased production of carbonic acid, as indicated by increased appetite—labourers who live at higher altitudes appearing to require more food than those who live at lower ones. The effects of a change to the mountains has been in a general way compared to that of taking increased exercise in the plains. Those effects are chiefly observed at first, and in a month the system has adjusted itself to its new conditions.

Mr. Shaw told me that in living at Ladakh, 11,000 feet above the sea, he knew no difference in his sensations from those he experienced in the plains, as long as he remained at rest. But active exercise required more exertion and deeper inspirations.¹

Alpine climates have been divided somewhat artificially into various zones, and their effects have been characterized as tonic and vivifying, tonic and exciting, &c. ; but such divisions are at best dependent on latitude and on local influences. To those who are familiar with a lengthened residence in the Himalayas, or who think of the elevation of Mexico and other inhabited parts of the world, some European directions appear amusing. Thus it has been laid down that patients must not stay more than from six

¹ Knowing that there was a common belief that cats could not live at high elevations, Mr. Shaw took a cat with him over a pass 19,000 feet high. The animal did not suffer in any way.

weeks to two months at heights of from 3,700 to 4,600 feet. At 3,000 feet you may stay some months ; at 1,500 to 1,850, the greater part of the fine season.

It is by no means easy to get very satisfactory evidence as to the health of residents in hill countries. There has been rather a tendency to over-praise their healthiness. The monks of St. Bernard, after a few years' residence at their height of 7,600 feet above the sea, break down often under asthmatic affections. In the lower parts of the Swiss mountains, dysentery seems to be common, just as it is in the Himalayas, and as diarrhoea is frequent in the Pyrenees, and low fevers are not absent. Sometimes a wonderful immunity from eruptive fevers is found ; but that is mainly, no doubt, from isolation.

It has of late been argued that consumption does not occur above certain heights. While there is little doubt that certain elevated spots enjoy a considerable amount of immunity from the disease, it would be easy to show that this is also the case with various places at the level of the sea, and that many elevated districts enjoy no immunity. Consumption undoubtedly occurs among the natives of the Himalayas, and is not infrequent, although it is tried to explain this away there as in Switzerland, by showing that those who suffer are placed under unfavourable hygienic conditions ; and among the children of Europeans in the Indian hills, acute chest and especially laryngeal attacks are common. To look at a few places in Switzerland : tuberculosis is said not to be common at Interlachen, a height of 1,700 feet, and still less frequent among the mountains around it. At Gais, 2,875 feet

high, there is a good deal of phthisis and rheumatism ; in the valley of Château d'Ex, 2,900 feet, consumption is common. In the manufacturing towns of Neufchâtel, 3,000 to 3,500 feet above the sea, every variety of phthisis is common. Chlorosis is said to be frequent in the Lower Engadine. At Leukerbad, 4,400 to 4,600 feet high, inflammations of the chest are a very common cause of death. At Davos, 4,700 feet, lung inflammations are common, but mild, and there is no endemic phthisis. At St. Moritz—and the country saying as to the Upper Engadine is, that it has nine months' winter and three months' cold—it is said that phthisis is unknown, that its natives only acquire it by a residence in towns, and lose it by a return to their native mountains !

It does not however follow, because there may or may not be a good deal of sickness or of lung affections in a place, that it is unsuitable, or the reverse, as a change to a consumptive patient during a certain season of the year. I would only say that mere elevation is no sure test of the healthiness of a place. Munich, some 1,500, and Madrid, some 2,000 feet above the sea, are, especially the former, anything but particularly healthy cities ; and for the present it seems to be a pedantic assumption to talk of living within or above tubercular zones. As the so-called tubercular zone is much lower in the north than in the south, it is evident that the influence of mountain air on phthisis is not dependent merely on atmospheric pressure.

The question of how far mountain climates are suitable for consumptive patients is at present exciting much interest, and it is not a little remarkable that abroad (for English

consumptive patients are seldom sent to spas) many of the commonest places of resort for such patients have for some years been baths situated at very considerable elevations. Eaux-Bonnes in the Pyrenees, 2,100 feet, and Mont Dore in Central France, 3,100 feet, have long been favourite stations. Görbersdorf in Silesia, a hydropathic establishment, 1,700 feet high, is not only advertised as being above the tubercular zone, but is a considerable place of resort for this class of patients. Consumptive cases have begun to winter at Davos, 4,700 feet, and even at the favourite St. Moritz, 5,700 feet. While Davos is in high repute, and frequented, and answering better than was expected, it is curious to observe that at the neighbouring baths of Fideris, 1,500 feet lower, it is stated that consumptive cases are unsuitable for them. The Spaniards have long sent such cases to Panticosa, of nearly equal altitude with St. Moritz ; and I have recently heard of great improvement in some cases of hæmoptysis at that place. On the other hand, Rigischeideck, an exposed station at the height of 5,000 feet, is found injurious to phthisis, and authors generally reckon such climates unfavourable in hæmoptysis.

On the whole the selection of the highest elevations, and still more of a winter residence in them for phthisical patients (although the climate in winter is steadier and less severe than was at first supposed, and mere cold is found to be not as inimical to phthisis as it was once thought to be), is less in favour now, than when it was first propounded ; but much further observation is wanted on these subjects ; meantime it is requisite to modify the old view that mountain climates are necessarily unfavourable to all forms of

consumption. In India, it used to be the established practice never to send phthisical cases to the Himalayas, any more than cases of disease of the heart or large blood-vessels. But as to the former class of patients this rule has been somewhat relaxed, and without bad effects, if not with striking benefit.

Cases of pulmonary phthisis are usually divided into two types—a commoner one, the torpid or lymphatic, and the more irritative or erethic form (which, however, supervenes towards the termination of the other form also); and corresponding climates, one favourable and one unfavourable to each state, have been defined rather arbitrarily. The first type would be considered the best suited for mountain climates, which in all probability are more useful in strengthening the constitution in early years, and in warding off phthisis, than in combating the disease when once established.

As to other forms of disease benefited by a mountain climate, dyspepsia is often relieved by it; appetite is frequently almost instantaneously restored, but these effects are not always permanent.

In Europe, on the idea that a more active circulation relieves congestions of the abdominal viscera, mountain air has been talked of as a certain cure in obstruction of the liver and of the spleen. But Indian experience would make one slow to endorse these opinions, or to expect much if those organs have undergone any considerable change. Nor is Indian experience in accordance with the European notion, that a hill climate is useful in dysentery and in diarrhœa. Some

of the worst forms of diarrhœa are endemic in some of the Indian hill-stations. After all, it is in cases of general debility, of slow recovery from acute illness, from child-bearing, or from protracted lactation, in anæmia and chlorosis, in women and in children, that the beneficial effects of mountain climates are most apparent; and most striking they are. Good results are also obtained in some neuralgias, and in cases of overworked nervous systems.

Diseases of the heart and large vessels, and advanced phthisis, are admitted by all to be unsuitable for the mountains, and tendency to apoplexy, and affections of the kidneys, by most writers.

When it is intended to send patients to mountain climates, it may sometimes be necessary, but scarcely in the case of English, to ascertain the elevation of a patient's home. Thus a patient sent from Munich or Innsbrück to Ischl or Reichenhall might benefit by the change, and by their sub-Alpine climate, but the benefit would not be derived from any superior altitude of these places.

With respect to the effects of the air of elevated stations, it should be remarked that the higher the situation of a bath, the higher bath temperature can be borne by excitable patients. The lower again the place is, the lower must the temperature of the bath be for such patients.

A few words naturally follow here about the change of air that is often sought for by others besides those who are actual invalids. It is generally best found in places of moderate elevation, although in some cases the greater heights are visited. Though the philosophy of the matter

was not very deeply studied, there has been in all ages a belief in the superior purity of country and of mountain air. Galen recommended the slopes of the then dormant Vesuvius. The Romans had their *Æstiva*, or summer quarters, the *sommer frische* of the modern Germans. The English sent their phthisical patients from the towns to country villages, or to enjoy the air of Scotch or Welsh mountains. Of late this feeling has revived very generally in Europe, and especially in Germany ; and as these summer stations are in much request, I shall enumerate some of them. In England we must look chiefly to the sea-side for change of air ; for in the way of places of any considerable altitude, we have only a few stations of about 1,000 feet elevation, such as *Buxton*, *Shap*, or *Braemar*. France, and still more Germany and Switzerland, are rich in such places. In the following enumeration of a few, I shall make little mention of those in the north or north-east of Germany, as English are not very likely to visit them. Many of these places are known for their mineral waters, their cold-water or their whey cures :—Many portions of the *Saxon Switzerland* ; *Alexisbad*, in the Harz ; *Liebenstein* and other spots in the Thuringian Forest ; *Wilhelms Höhe*, close to Cassel ; any of the baths of the *Black Forest* or *Badenweiler*.

In France, *Remiremont*, near Plombières, or *Gerardmer* in the same district, at a higher elevation ; various stations in the *Jura*, as *Weissenstein*, which is Swiss ; *Divonne* ; almost any of the *Pyrenean* baths, or *Mont Dore*.

Or coming to the Bavarian Alps we have *Kreuth*, *Tegern See*, or *Berchtesgaden*, finest of all.

In Salzburg, *Gemunden*, *Ischl*, *Aussee*.

In Tyrol, the *Achern See*, *Obladis*, with mineral waters ; *Sterzing*, villages above *Botzen*, *Mitterbad*, *Brennerbad*, the cheapest place I know.

On the mountains behind Lugano, the establishment of Monte *Generoso* has sprung into deserved popularity, but there is no carriage-road to it or to *Obladis*.

Swiss places are so known that I shall not mention many. Of considerable elevation are *Heiden*, *Albisbrunnen*, *Gais*, *Engelberg*, *Fideris*. Of still greater height, over 4,000 feet, *Tarasp*, *Samaden*, *Pontresina*, *St. Moritz*, *Davos*, *Rigi*, *Leuk*, *Andermatt*, *Zermatt*, and *Bell-alp* and *Ægishorn*, at heights of 6,317 and 7,695 feet. Many other stations will occur to Alpine travellers.

The *Apennines* scarcely afford any summer retreats cool enough for the English.

In strong contrast to the rarefied air of considerable mountain elevation, are baths of compressed air.

Compressed Air.—Many baths, such as Wiesbaden and Reichenhall in Germany, various establishments in France; and, I believe, some hydropathic ones, as Malvern and Ilkeley in this country, have compressed air apparatuses. They resemble a huge diving-bell, with partitions in which the patients place themselves. The chief palpable feeling to the patient is a certain amount of ringing in the ears, and it seems to be ascertained that the frequency of the respiration and of the pulse is diminished considerably. The explanation of why the frequency of the respirations is diminished and each respiration is lengthened, is, according to Panum,

that the air in the intestines, owing to the compression to which it is subjected, does not exercise the usual amount of pressure on the diaphragm. No satisfactory reason has yet been adduced for the lessened activity of the heart. It would appear that the capillary vessels are unloaded, which would explain how toothache is frequently relieved by compressed air. My friend Dr. Liebig, of Reichenhall, who has long studied the subject, has arrived at the following results. The amount of air expired under ordinary and under increased atmospheric pressure is found to be practically the same. The mean quantity of carbonic acid expired under high pressure is only a trifle less than under normal. If a man under ordinary pressure expires 755 grammes in the twenty-four hours, he would expire 727 under increased pressure. While the slowness of the pulse induced by compressed air does not last on removal from it, it is said that there is no doubt as to the retardation of the respiration continuing for some time. Patients remain from one hour and a half to one hour and forty minutes in the apparatus, during one hour of which they are exposed to the constant pressure of one and a half atmospheres. The remaining time is occupied in raising and in lowering the pressure. In these experiments Dr. Liebig says he has frequently been for a considerable time under increased atmospheric pressure, and it was pleasant to be able to observe in his own person both the suppression of fresh catarrh of the air-tubes, and also the agreeable effect of the pressure on his general sensations. The pressure was increased to one and three-quarters atmospheres, and he found his sensations still pleasanter than under the usual

pressure of one and a half atmospheres, but we have seen¹ that labourers can work without any inconvenience, except a noise in their ears, under the pressure of four atmospheres and more. The inhalation of compressed air seems to increase the vital capacity of the lungs by mechanically expanding them, and it will be a very interesting fact, if future observations shall confirm it, that the retardation of respiration is not merely temporary but lasts for some months. Meantime compressed-air baths are said to be useful in loss of voice, in chronic bronchitis, and the results of pleuritic attacks, especially so in catarrhal deafness, and even in chlorosis and anæmia. What seems to be tolerably ascertained is, that they have been of considerable use in some cases of asthma ; indeed, Dr. Liebig has seen wonderful relief afforded in asthmatic attacks associated with chronic bronchial catarrh. The relief often lasts for six hours or more, and the catarrhal stage is greatly shortened. The effects in asthma he believes to be permanent, if the use of the compressed-air bath be continued sufficiently long. But in that affection what remedy has not failed, and what has not seemed to succeed ? On the whole, I do not think it likely that compressed air will be found to be a therapeutic agent of much importance ; but those who have practical experience of its employment, are more sanguine.

¹ Note, p. 32.



CHAPTER III.

SEA-AIR, WINTER RESORTS, AND HOT-AIR BATHS.

ALTHOUGH, singularly enough, few mineral waters of any importance, except some in the extreme south of Europe, are situated close to the sea, yet, as sea-air forms an important element in the effects of sea-bathing, it may be well to say a few words concerning it.

As there is the least barometric pressure at high elevations, so there is the greatest at the sea-level. Its variations are also greatest there. The temperature of sea-air is on the whole lower than that of land-air, and is less variable. If the summer heat is not so great, so also is the winter cold not so intense as in inland situations. Owing to the surface evaporation, the absolute moisture of air at sea is somewhat greater than that of land-air, and the rainfall is greater on coasts than in interiors. It is freer from organic impurities than land-air, and contains more particles of common salt. It also contains a good deal of ozone, a form of oxygen about which wonderfully little as to its operation on man is known with certainty; any quantity of iodine that may be present in the air is much too small to have an appreciable influence on man, and the smell of it in sea-air,

often talked of, is no doubt mainly derived from the sea-weed when the tide is out. It has been thought by some, that with the greater atmospheric pressure more carbonic acid is expired from the lungs at the sea-side, the inhalation of oxygen thereby increased, and the processes of blood-making and of nutrition thus quickened. However, it is not likely that there is much difference in the quantity of carbonic acid expired. Experiments have seemed to show that sea-air produces, almost immediately on arrival at the sea-coast, a great increase both of retrogressive and of progressive change of tissue, as manifested by a striking increase in urea and diminution of uric and phosphatic acids in the renal secretion, in greatly increased desire for food, and remarkable augmentation of the weight of the body. To use simpler language, to the great majority of men a change to sea-air is bracing and invigorating. It exercises, very probably owing to its increased moisture, and very possibly owing to the saline particles it contains, a favourable influence on most bronchial affections, and in diseases connected with defective nutrition, especially in early years. Sea-air must be one of the agencies which make sea-voyages so useful in chronic diarrhœa and dysentery.

Places on the sea-coast, whether in England or in France, have long been the favourite resorts of people with delicate chests or of a strumous habit of body. And although many German writers do not advocate the air of sea-coasts in such cases, I believe that up to the present time nothing better can be recommended in threatened phthisis, in bronchitis, some forms of disease of the kidneys, and of rheumatism,

than such places; and natives of the north of Europe are sent with great advantage during winter to some of the many places in the south—most of them near the sea-coast, and chiefly that of the Mediterranean.

But the value of such places does not depend solely on their sea-air. Their most striking characteristic is their higher winter temperature, which is readily apparent from the following comparison of the mean winter temperature, from October to April inclusive, of a few well-known places:—Dresden, $38^{\circ}7$; Vienna, $40^{\circ}5$; St. Leonards, 42° ; Meran, 44° ; Penzance, 45° ; Pau, 47° ; Cannes, 52° ; Palermo, 56° ; Malaga, $57^{\circ}5$. Thus, if you wish to avoid the cold of a northern or continental climate, you must go as far south as the shores of the Mediterranean.¹ In like manner if you are to avoid rainy days you must go south. In London you have 170 rainy days, in Cannes 70; in Berlin you have 150 rainy days, in Meran only 50, in the year.

There is ample scope for selection among these places, and there is an absurd amount of fashion which often determines the popularity or otherwise of a new place; much petty refinement about shades of climate. A new station is spoken of like a new medicine. Unnaturally sharp lines of demarcation are drawn between the various forms of lung-disease, and between the different climates suited to each. The points to be ascertained respecting the fitness of the climate of a particular place as a winter residence for

¹ How very relative climates are, may be gathered from the fact that the island of *Marstrand*, on the coast of Sweden, in latitude 58° , is the Madeira of the people of Archangel in 64° .

invalids are essentially these—the amount of moisture in its atmosphere, the number of dry days, the nature of the soil, the direction and prevalence of winds, the mildness of the temperature, and its daily range. This last has always been thought of great importance, and deservedly so, although it has been argued that as invalids must keep the house after sunset, considerable depression of temperature during the night is less important than might be supposed.

The English health-stations may be classified roughly as those on the east, or on the west side of the island. The former are considered the more bracing and stimulating, being drier, the latter more sedative and damper. On the south-eastern coast the places best known are *Hastings* and *St. Leonards*, *Eastbourne*, *Brighton*, and *Worthing*. Further west we have the *Isle of Wight*, *Torquay*, and *Penzance*. In Ireland, *Cork* and *Mallow*. In Scotland, *Rothesay* and the *Western islands* generally. *Torquay*, *Penzance*, and *Cork* have the warmest winter climates in Great Britain. *Bournemouth* and *Ventnor* occupy a somewhat different and intermediate position. The former favourite place is supposed to owe much to its sandy soil and pine woods. *Jersey* and *Guernsey* offer an insular climate, with a smaller range of temperature, and less cold in winter than London, but with a considerably larger fall of rain.

Crossing to France we find *Arcachon*, owing its popularity mainly to similar conditions, but how much livelier do the French make it than Bournemouth !

Proceeding south we mention *Pau*, although it is inland.

Pau has a tolerably severe winter, and its temperature is

several degrees lower than that of the Mediterranean stations. But its early spring is delightful. Its climate is considered to diminish irritability, but it does not suit the depressed, and is bad for rheumatism. There is more rain than on the Mediterranean. The stillness of its atmosphere has probably been exaggerated, but its north-west wind is not the drying-up mistral of places further east.

Amélie les Bains in the Eastern Pyrenees, notwithstanding its mild climate, is too open to the east, and is too much shut up from the sun by mountains. It is wonderfully cheap.

Passing by *Montpellier* (and at least a century ago they had begun to suspect that it was not suited for pulmonary cases), we come to the health-resorts east of *Marseilles*.

Some common features characterize the principal stations of the northern shore of the Mediterranean; that is, *Hyères*, *Cannes*, *Nice*, *Mentone*, and *St. Remo*. At the four last at least patients often complain of the sea-air being too exciting and causing sleeplessness. The mistral, or north-west, and the east are the winds to be guarded against. On the whole the mistral is felt more in *Hyères*, *Cannes*, and *Nice*, and the east wind more in *Mentone* and *St. Remo*. The prevailing rock along the whole coast is limestone, and its dust is irritating to the lungs. Along the shore at *Cannes* the formation is gneiss, and its dust less irritating. All these spots are usually sunny and cheerful.

Hyères, much the cheapest of these places, is perhaps the

least picturesque of them, and is too open to the mistral. It is nearly three miles from the sea. It is quiet and rather dull.

The four next places, Cannes, Nice, Mentone, and Remo, may all be considered to have two bays, an eastern and a western one, and this gives considerable choice of locality and of climate.

Cannes is at present the most popular with the English of all these stations, and *Le Cannet* is its most sheltered part : it is away from the sea, and the further you go from the sea the more mild and the less tonic is the climate : the mistral is worst in March.

Nice is pretty well protected from the east, but not from the west. After March the dust is bad. It is in many ways a desirable place of residence, but for pulmonary cases not so good as the neighbouring stations. A patient of mine, who had been long dying of pulmonary consumption, and who had made trial of all the stations of the Riviera, of Pau, of Algiers, and of Madeira, told me that he thought on the whole Nice suited him best, mainly because it was not a station solely of invalids, and because it offered him some variety. *Cimiés* is the most sheltered part of Nice.

Monaco, and still more *Villa Franca*, are better sheltered than either Cannes or Nice.

At *Mentone* the air is stiller than at Nice, and in the east bay than in the western and more open one. It is well sheltered from the north, and the mistral is less severe than further west. On the other hand it has more east wind. East and south-east winds are the worst here. The eastern

bay has a want of air ; there is not sufficient space between the houses and the hills behind.

San Remo, though the place has still to be made, is a very desirable quiet residence. It suffers scarcely at all from the mistral ; it is pretty well protected from the north and north-west winds, but the north-east is at times troublesome, and there is a good deal of east wind in February and March. It is slightly warmer than its neighbouring rivals.

Ajaccio is probably the one of those stations that has most advantages of climate, but for the present it suffers from the want of good hotels and other accommodation. Although easily reached by steamer, its insular position is a drawback.

It has been too much the fashion of writers on the climate of the Riviera, to decry that of other places. But the climates of some Italian cities are not to be so entirely condemned as they have of late often been.

Genoa.—I believe all are agreed in thinking it unsuited as a winter residence for invalids with any pulmonary affection.

Spezzia is scarcely known as a winter residence, though a favourite place for sea-bathing, with which its new arsenal and docks need not materially interfere.

Pisa is a rather dull and gloomy place of residence. It is pretty well sheltered from the north. Its climate is somewhat humid and sedative. It long enjoyed a great repute in pulmonary complaints, and is, I believe, unjustly depreciated at present ; still it is not a tempting place for invalids.

rence, which is a considerable distance from the sea, is

not suited for pulmonary invalids, though cases of asthma sometimes do well.

Venice at most seasons of the year has a mild relaxing climate. In winter it is a cold place, and there is little shelter to be had from the wind except along its southern face ; yet it is a good deal resorted to by Germans.

Rome has a mild winter climate, which is sedative. Although it is no longer recommended in pulmonary cases, as it was by Sir James Clarke, who practised here for many years, it is now too strongly condemned, mainly on the ground of patients being exposed to the risks of over sight-seeing. Many cases of threatened phthisis may do well.

Naples, in the last two and first month of the year, has a good enough climate for *poitrinaires*, but the spring climate is variable and the changes of temperature are very sudden. Of late years a great deal has been heard of Neapolitan and Roman fevers.

Palermo,[†] in Sicily, perhaps having the mildest climate of all these winter resorts, is a good winter residence for those who cannot afford the expense of Egypt. It is somewhat damp and exposed to the north-west winds, but it is a good deal warmer than Cannes.

Catania is sunny and sheltered by Mount Etna. It has a smaller daily variation of temperature than Palermo ; and now that it is provided with a good hotel, it deserves to

[†] The thermal springs of *Termini* are some twenty miles from Palermo. They are perhaps the least forgotten of the many Sicilian waters, much used once, now mostly in oblivion. Before such places are revived, the island must be purged of bandits. They were never worse than at present. It is unsafe to walk outside Palermo.

grow in popularity. It has hitherto been little known. It is said to be the best lighted city in Europe.

Malaga.—This is the only Spanish place I shall mention, as it is the one best known. It has a dry warm tonic climate, with slight daily variations of temperature, perhaps the best one in Europe for cases requiring such a climate. It is worthy of remark that its chief rainfall is in February and in January, but the soil soon dries. There are comfortable hotels. Not far off is one of the most popular watering-places in Spain.

All the places just enumerated are getting more expensive every year. Two years ago I found Cannes and Nice the most so, while Hyères and Amélie les Bains were moderate.¹

According to the usual classification of climates, Pisa, Palermo, Rome, Pau, Amélie, perhaps San Remo, are considered to have sedative climates; while Cannes, Nice, Mentone, most mountain and sea climates, are considered to have stimulating ones.

Before leaving the subject of winter resorts, I would observe that the English very generally delay too long in the year their journey to the south. They ought to arrive at

¹ An amusing *brochure*, attributed to Dr. de Hartsen, of Cannes, gives an account of the delights of the winter station of Doux-Repos. He tells us how successful Dr. Anglicide has been in utilizing for the benefit of the *poitrinaires*, by means of pulverizing and inhaling apparatuses, one of the natural products of the place, its fine calcareous dust. He explains how the very disadvantages of a place may be converted into its recommendations; how in his winter station the *bise* is adapted for the lymphatic form of phthisis, the southern wind for dry coughs, and how the patient is to remain at home or go out, according as the wind suited to his condition blows or not. He tells many unpleasant truths, for instance of the doctors often playing into the hands of the lodging-house keepers.

their destination by the middle of October at latest. They are also apt to return to England too early in the year. The beginning of June is early enough. Pau, or Arcachon, or Meran, or some of the stations on the Lake of Geneva, are convenient resting-places on their way back, unless they will ascend some of the higher mountains and try the milk cure of the early season.

It is far more important than settling minute differences between allied climates, and pronouncing positively on imperfect data this air to be bracing, that relaxing (and patients are taught to expect stimulating or depressing effects), to select a place with such a winter climate that a patient can be as many hours as possible in the open air, one which is tolerably cheerful, and in which he will not see too many sick faces ; above all, one in which comfortable lodgings and good food are to be found, for without them, and unless he will make up his mind to live as an invalid, a patient, if his case be at all advanced, had better remain at home. I have little doubt that such places with their sea-air, though some are not actually on the coast, are far better adapted for cases of phthisis and of bronchitis than inland places, such as *Wiesbaden*, *Gleisweiler*, or *Canstadt*, or even than *Montreux* at the east end of the Lake of Geneva, or *Meran* in the Tyrol, the last of which is the great winter resort of Germans. In spite of a pretty severe winter it has a great number of fine days. It is a delightful residence in spring and in the later autumn. Its growth has been wonderful, and comfortable homes and *pensions* have sprung up to suit all tastes.

Botzen and *Gries* resemble Meran in many ways, but afford little choice of residences.

Lugano too is sheltered, and has a warmer winter climate than Montreux or Meran.

Arco near the Lago di Garda, and *Bellinzona* near the Lago Maggiore, have been sought by the Germans as winter quarters, especially since a residence in France has become disagreeable to them.

But a sea-voyage presents the most complete opportunity of freely inhaling the sea-air ; and the immunity of sailors from chest complaints is remarkable. There is a considerable variety of opinion as to the amount of advantage to be derived from sea-voyages. Pliny said that patients in his day ordered to Egypt for phthisis, as they are now, profited more by the long voyage, the sea-air, and the sea-sickness, than by the residence in Egypt. I am inclined to believe, from personal observation, that young people, from fourteen to twenty have often derived great benefit from long sea-voyages in warmer latitudes ; and that even at more advanced years, when patients have what are called delicate chests, and there is merely a suspicion that phthisis may set in, the disease has been frequently warded off by a voyage. If the disease is at all advanced, a voyage may still, like most changes of place, help to prolong life. Sea-air is an important element in the sea-side cures of scrofula ; but more will be said respecting that condition of system under the head of sea-bathing. Almost the only contra-indication to sea-air appears to be in cutaneous, and in some bronchitic and asthmatic affections. It would be interesting to ascer-

tain whether the common impression that sea-air is injurious in skin complaints is really well founded.

After what has been now said of the effects of mountain and of sea climates, no one can fail to remark that they have been recommended in the same classes of disease, in recovery from acute illness, in anæmia, in scrofula, and in consumption. There is indeed very great difference of opinion about the best ; most authors have advised for it the level of the sea-side, others the aromatic air of the steppes of Russia ; others think it wiser that patients should go to high ground, but not above 2,500 or 3,000 feet in Europe ; while another view is that they should be at least 2,000 feet higher up. If the inhalations of vapour now so popular abroad be of any real value, moist climates are probably not so injurious in phthisis as is commonly believed. Still, in all these recommendations the same advantages are looked for from such very different conditions of atmospheric pressure, of temperature, and of moisture, that fresh study of the subject, and a new analysis of the agencies in force, are urgently required.

Before leaving the subject of mountain and sea air, I may add, that in many cases where the reactive powers of the system are not much impaired, while gout is flying and not yet fixed, when only a short absence from home is possible, the mountain-air of our own Highlands (a visit to which often involves a sea-voyage also), aided by the active exercise which a sportsman must take, will often prove more efficacious than a hurried visit to a foreign spa—nay, I have heard of ladies, suffering from simple debility, profiting more by the air of Braemar than by the iron of Schwalbach,

although the elevation of the latter only falls 200 or 300 feet short of that of the former. I have known a German lady, a great traveller, reach Braemar and be so satisfied that she had at last found an air to suit her, that her family had difficulty in getting her to leave it.

I have thus imperfectly sketched the general operation of sea and of mountain air. Before quitting the subject of atmospheric air, I must allude to the use of air heated beyond any temperature sought for in ordinary changes of climate, but the employment of which has been as it were suggested by Nature in the *stufas* which exist in various countries, such as those of San Germano, Nerone, Monsumano, the Lipari Islands, Cransac, although their air usually contains vapour of water.

Dry hot-air baths differ from vapour baths in not impeding the circulation as the latter do, by depositing moisture in the bronchial tubes. The lungs, instead of having, as they usually have, to heat up the inspired air, are subject to a temperature above their own. Hot-air baths favour perspiration in the greatest degree; while vapour baths, from the quantity of moisture already present in the air, retard it. If very hot, they raise the temperature of the body by several degrees. In using the hot-air baths, invented by the Lacedæmonians, adopted by the Romans, and now so popular throughout Europe¹ (and of which there are many modifications),

¹ Erasmus, in 1525, gives the following account of the hot-air bath attached to an ordinary German hostelry:—"There often assemble in the same hypocaustum some eighty or ninety persons—foot-travellers, horsemen, merchants, sailors, coachmen, husbandmen, boys, and women—some healthy, some sick. There are no separate compartments, as in France, no privacy. There one cleans his boots,

the patient goes first into the *tepidarium*, which has a temperature of 113° to 117° , in which he remains naked, and at rest, until the perspiration, bursting forth, begins to form drops, or 25 to 40 minutes. He next proceeds to the hottest room, or *sudatorium*, of a temperature of, say, 133° , and remains there till the perspiration runs down the skin, or 12 to 18 minutes. A servant then, by means of a woollen glove, rubs off the perspiration, and next kneads all the muscles for 4 to 6 minutes. The patient next proceeds to the *lavacrum*, where he has water poured over him of the temperature of 81° to 86° ; next the whole body is soaped over, the suds rubbed off, and the patient betakes himself to the *frigidarium*, where he lays himself on a couch, still unclothed, and waits till his skin is completely dry; this last measure may last 25 or 30 minutes, when he dresses and leaves the bath greatly refreshed.

Under this head would come the hot-air baths so readily procured by means of a spirit lamp, although in this case, as

another combs his hair, another rubs off his perspiration, while a fourth belches his garlic and sausages. The more persons there are in the hypocaustum, the more it is heated up, the chief point in the treatment being to make all run down with perspiration. If anyone half-suffocated opens the window an inch, he is ordered to shut it instantly. Nothing, in my opinion, can possibly be more dangerous than for such a crowd of people to remain for hours together with all their pores opened. Many labour under hidden diseases, and no disease is without its contagion. The Spanish, or, as some call it, the French, scabies is no less dangerous than the leprosy. Such baths were common in Brabant twenty-five years ago, but the new scabies has taught us to be cautious." The use of these baths became again very popular in England in the latter half of the reign of Charles II. The gross immorality connected with the old "hot-houses," as they were called, is sufficiently indicated by the word "stews," from *stufa* and *bagno*. Both hot-air and vapour baths appear to have been used by the Romans and in the Middle Ages, as they are now.

indeed in the hot-air bath just described, there is always a certain amount of vapour present. There is no readier way of inducing profuse perspiration when it is desired, than by them, and in their use the stimulating effect of dry air on the lungs is avoided, as their operation is usually confined to the skin.

At this moment hot-air baths, and the allied Russian, Turkish, and Egyptian ones, are to be found in almost every city of Europe, and gladly resorted to by patients, when it is explained to them, that their maladies are caused by "*certaines humeurs qu'entre nous autre savants nous appellons humeurs peccantes.*" But they often cause exhaustion, and are not to be lightly prescribed to those who have reached middle age. Something more will be said afterwards of them.

CHAPTER IV.

EXTERNAL USE OF WATER.

ALTHOUGH most mineral waters are valued more highly for purposes either of bathing or of drinking, yet there are few spas at which both drinking and bathing are not practised. The one is usually made to supplement the other. If the mineral water is not of much efficacy internally, some imported water from a different source is drunk, and, on the other hand, arrangements are made to supply the deficiency, if the waters are not considered efficacious in baths. We shall first consider baths; and as their primary action is exerted by the action of heat and cold, through the medium of water, on the cutaneous surfaces, we must first say a little of common water, and analyse its effects as it is applied at various temperatures.

The first use of bathing water is simply as a detergent to remove any impurities from the surface, keep the skin clean, and prevent the pores from being clogged by their own secretions or other impurities.

But a question of much importance in the solution of the theory of the operation of bathing is, does the skin absorb

water? This is the popular belief; and the story of shipwrecked sailors relieving their thirst by wrapping themselves in cloths dipped in sea-water, has become a standard one. Such a measure might, however, granting the facts, give relief to the feelings in various ways, without any actual imbibition of water; and the result of the most carefully conducted experiments of late years would seem to make it very doubtful, whether any water at all is absorbed by healthy cutaneous surfaces, even after continued immersion. Clemens, perhaps the latest authority on the subject, thinks that he has proved that a full-grown man, after a twenty minutes' bath at a temperature of 88° to 101° , takes up $4\frac{1}{2}$ to '6 drachms of water, not much over half an ounce; and he thinks that most water is absorbed, when the temperature of the bath is from 94° to 105° .

But if no amount of water, that can be considered to have any effect on the current of the circulation, is absorbed, there is no doubt as to the powerful influence of water on the capillaries of the skin, and the mode and extent of that operation depend primarily on the temperature of the fluid; for the influence of the mechanical pressure of the water of a bath, which has been calculated at nearly one pound on every square inch of the surface, has never been determined. Baths must therefore be considered according as they are hot or cold. We have not space here to discuss the influence of heat and cold on the system—the abstraction of heat from the system by cold water, and the means by which the system reproduces heat, even in excess of the previous temperature; but it may be well to point out one or two general facts, that

the human system bears changes of temperature of air much better than of temperature of water, and can adapt itself therefore to very various climates, the great agent that protects us against the action of extremes being the capillary vessels. While the temperature of the air at 75° is, perhaps, almost too warm for the feelings of many, a continued bath at that temperature is felt to be cold, and is depressing. On the other hand, a bath of 98° to 102° acts far more excitingly than air of the same temperature, both because, being a better conductor, it brings more heat to the body, and because it suppresses the cutaneous transpiration, which is greatly increased by air of that temperature. It may be mentioned here, that a temperature of 88° to 95° has been found to be the temperature of indifferent baths, which can be borne longest by most men. We must now examine the effects of a cold bath on the system.

*Cold Baths.*¹—Cold water has only one mode of action on the system, by refrigeration. Different physiological effects are produced according to the degree of temperature, and the length of application of the water, or refrigerating medium. The effects of a cold bath—the temperature not being below 50° —are shortly these: a diminution of the temperature of the skin, and of the subjacent tissues and blood, the greatest diminution of temperature being, according to Jurgensen, not

¹ I may remark in passing, that Sir John Floyer contributed much by his writings to the revival of the cold bath in Europe, although he rode his hobby so hard as to attribute what was thought the recent appearance of rickets in England to the abandonment of the practice of total immersion in baptism. This was about the year 1700.

during the bath itself, but some little time after it ; a certain feeling of shock diffused over the whole surface, and, if the cold is intense and prolonged, inducing a certain amount of numbness of the skin. It becomes pale, and its capillaries contract. The action of a cold bath on the central organs is referable to the brain and spinal system, to the lungs and heart, as manifested by the tremor of the limbs it produces, along with a certain degree of oppression of the chest and gasping for air, while the pulse gets small and sinks. After a time reaction takes place, bringing redness to the skin and an increase of temperature.

The colder the water is, and the more powerful and depressing its effects, the quicker and the more active is the reaction. After reaction, the bath may be continued for some time, provided the water is not extremely cold ; very cold baths (anything below 50°) cannot be borne long, and must be concluded without waiting for reaction. If the bather remains quiet, and the water is not agitated, the portion of the water in contact with the skin has its temperature to a certain degree raised by the heat of the body, and the stimulus is less ; but if it is agitated or changed, so that fresh cold water is applied to the surface, fresh stimulus and reaction follow.

The effects of cold water on the human frame have been studied since the days of Priessnitz with a degree of minute observation never before bestowed on them ; and the principles of *hydropathy* are now so well established, that they cannot be passed by without some notice of them, as they are explained by some of the best writers on the

subject. They may be said simply to rest on the power of abstracting heat from the body, and of stimulating it by the application of cold water. The effect is depressing or exciting according as the withdrawal of heat or the stimulation predominates.

First.—Much depends on the form of the bath.

(a.) There is its depressing operation ; loss of animal heat, retardation of the circulation, and feeling of weariness when the same water remains in contact with the skin, and there is continued withdrawal of heat without fresh stimulation. Under this head come full baths, in which the patient remains quiet, partial and complete covering of the body with wet sheets left unchanged (in which last, owing to an external covering being usually applied, the loss of animal heat is less), frictions without removing the wet sheets, also local baths of a similar nature.

(b.) Its exciting operation ; quickening the action of the heart and lungs ; feeling of glow and of nervous excitement ; feeling of increased muscular power. These sensations occur when the layer of water next the skin and heated up by the body is removed, and fresh cold water causes fresh stimulus. Under this head come full baths with the water in motion, frictions when the wet sheet is removed from the body, douches, shower-baths, bathing in rivers or in the sea, and local baths, in which the water is changed.

Secondly.—Much depends on the temperature of the water. The feeling of depression occurs much earlier in very cold water than in warmer, and, in the same way, the exciting operation comes on faster with the colder than with

the warmer water ; but water of the same temperature acts differently according to the form of the bath.

Thirdly.—The degree and mode of the operation of the bath depends much on its duration. The short duration of the bath makes both its depressing and its exciting action less ; its longer duration increases them ; but if the bath be continued too long, the continued abstraction of animal heat may prove very depressing.

Further modifications of hydropathic practice are to be found in the local application of cold, local douches, local wrapping up,¹ and especially in the sitz baths. These effects are the greater, because the local abstraction of heat is more powerful than the general, and because the action of local can be kept up longer than that of general applications. Another important practice, though it cannot be in any way considered as being peculiar to hydropathy, is the production of copious sweating by packing in sheets surrounded by impervious covers, by hot air or vapour baths. In this way the animal heat becomes so raised, that the shock of a cold bath can be borne.

The general effect of hydrotherapy may be thus summed up. The system is subjected to alternate periods of excitement and of rest. There is a powerful and immediate

¹ Like many other modern remedies, the wet sheet has less novelty in it than most suppose. Musa, in the reign of Augustus, was one of the first professors of hydropathy. He had immense popularity until the young Marcellus died in his hands. Lucas, writing a hundred years ago, says : "I know a gentleman not far from eighty years of age. He sits or stands naked while his servant wraps him up in a sheet dipped in cold water, and he continues in this from twenty to thirty minutes every morning, winter or summer, and in return has uninterrupted health."

cooling down of the whole body and of its individual parts, especially of the skin, with persistent contraction of the capillary vessels and local anæmia. This is followed by its reverse, or by local hyperæmia. There is powerful excitement of the vascular and nervous systems.

The processes of absorption and of excretion are stimulated. The circulation of the blood, and the transformation of tissue, are materially affected by the increased amount of water introduced into the system by drinking, and by the increase of perspiration. In most cases there is a greatly quickened disintegration and renewal of tissue; and in some cases, by the application of the milder form of hydropathic practice, they may even be retarded.

In what has just been said, most has been attributed to the action of water on the surface of the body; in Germany, at least, water-drinking is but a secondary part of the treatment, and, indeed, is not peculiar to hydropathy; nor has anything been said of the rashes and boils which follow the continued application of all waters to the skin, and which patients are pleased to watch for, under the old notion of their being critical.

We must next consider warm baths in contrast to cold ones. Their general effects may be gathered from the following account of their operation at various temperatures.

Warm baths are usually divided as follows, according to their temperature; different people are more or less easily affected, just as their sensibility to pain is various; but the average operation of baths is well known.

Tepid, 85° to 95°. The effects of a bath of this temperature are confined to the peripheral extremities of the nerves, and are so slight that they do not extend to the central nervous system, or to the circulation. Neither the pulse nor the secretions or excretions are affected. As no heat is taken from the system or confined in it, there is no reaction, and the animal temperature remains the same. These are the sort of baths that people can bear for hours with impunity.

Warm bath, from 96° to 104°. In this, the action of the heat on the peripheral surface is propagated to the central and nervous systems, and causes a reaction, which manifests itself in a moderately increased flow of the circulating fluids towards the surface, and in an increased frequency of pulse, without affecting the respiration. Its further operations are believed to be a slight excitement of the process of the renewal of tissue, and some operation on the mucous membrane of the respiratory and alimentary tracts, without materially affecting the action of the kidneys or of the intestinal canal.

With a *Hot bath*, the temperature of which may be taken in different individuals at from 102° up to 110° or 112°, the central nervous and circulating systems are more affected. The frequency of the pulse increases greatly ;¹ the respiration becomes anxious, quickened, and interrupted by deep inspira-

¹ The contrast between the depressing effect of a cold, and the exciting one of a hot bath on the pulse, is strikingly shown by the graphic delineations of the sphygmograph. The pulse produced by a hot bath is very similar to that produced by active exercise, such as rowing.

tions. The skin is in a hyperæmic condition, and the retained animal heat bursts out in a profuse perspiration.

Very hot bath; everything above 110° is very hot, and 120° is almost scalding. Such a bath can only be borne for a few minutes, and must be used with great care, owing to the violent stimulus which it communicates to the peripheral system. There is violent reflex action on the heart and on the whole arterial system, and the actions mentioned under the last head are all exaggerated; it is only to be used when a very powerful stimulus is required.

Of the above, the tepid and the warm bath have an especially soothing effect on the system.

Vapour Baths.—A word or two must be said about a modification of the warm baths, in which water is presented in the form of *vapour*. In volcanic countries, as in Sicily, the Lipari Islands, and Ischia, natural vapour baths have long been in use. Besides vapour of water, they contain various gases. Much of what has been said above of air-baths is applicable to those of vapour. Man cannot bear as high a temperature of moist as he can of dry air. It is a familiar fact that a man can bear a much higher temperature of vapour than of water, and he can bear a vapour bath for a much longer time, if he does not inhale the vapour.

Vapour baths produce profuse perspiration and act in cleansing the skin much as hot-water baths. Vapour being a slow conductor of heat, does not act so fast as water on the body. Vapour baths can be borne hotter than warm-water ones, but their use cannot be continued so long, as vapour being a bad conductor prevents radiation from the body. In

these baths—known to us as *Russian* and as *Turkish* baths, varying from 106° to 112° —a higher than 122° is not borne comfortably. The vapour bath, though falling considerably short in temperature of the air bath, raises the heat of the blood somewhat more. In the use of such baths the detergent action on the skin is aided by various mechanical processes, such as the application of lather and scraping. In the Russian bath a slight amount of stimulation of the surface is caused by beating with birchen twigs ; but complete revulsion is produced after the beating process, by plunging into a cold bath, or, as in Russia, into the snow, or being subjected to a cold douche, after which the patient is made to lie down, and remain covered up for some time before he quits the bath house. The great virtue of such baths is mainly in their sweat-producing properties, which they share in common with various hydropathic processes—than which, however, they are pleasanter to the sensations. In this country there is great risk of catching cold after vapour or hot-air baths. Quite recently I have seen a case of hæmaturia produced by it.

Vapour baths and douches may be used locally with much advantage. In France they are not so fond of general vapour baths as elsewhere. They prefer the vapour being applied to the person in a box, arranged so that the patient does not inhale the vapour.

It is to be regretted that of the absolute effect of simple cold or warm baths on the secreting processes very little has been ascertained. Cold baths tend to check cutaneous transpiration ; warm ones favour it.

It is supposed that cold baths, by the stimulus they give, increase the secretion of the gastric and other fluids of the stomach and alimentary canal ; that warm baths rather serve to retard it. Either hot or cold baths, but especially the latter, serve to favour the secretion of urine ; and experiments would seem to show that warm baths increase the secretion of urea. Whether warm or cold baths, like the breathing of hot or cold air, have any effect on the exhalation of carbonic acid, has not been determined by experiment.

This *résumé* of the effects of cold and hot baths ought to have prepared us for the comparison of their operation ; in many respects the end obtained by the use of either is the same, although the process is reversed.

The warm bath causes swelling and congestion of the capillaries of the surface ; then, when the stimulus of heat is withdrawn, their contraction ensues. A cold bath again first causes a contraction of the capillaries of the surface, which is followed by their expansion when reaction sets in. Both by bringing a supply of heat to the body, and by preventing radiation of heat from it, a warm bath increases its temperature ; it can be borne longer than a cold bath, and, instead of favouring internal congestions, it draws the blood to the surface. There is in either case increased oxidation or waste of tissues ; but with the hot bath there is no great call made on the system to produce the oxidation, which is mainly dependent on the increased heat of the blood mechanically produced. A theory of why, if a man is much exhausted, he feels a hot bath refreshing, while he cannot bear a cold one, is this, that the increased heat conveyed to

him helps the process of oxidation, and so relieves his system ; cold refreshes by exciting the functions—heat by physically relieving them ; a hot bath calms by reducing the natural amount of loss of heat, and by supplying an equable temperature.

Very hot baths, it is true, act as stimulants to the heart and nervous centres, but they do it more gradually and with less shock than cold ones ; and in the main, as already said, they occasion a flow of blood to the surface, not to the deep-seated organs. Finally, everyone is familiar with the fact, that warm water softens and cleans the skin more readily than cold ; and sweating may be produced in the patient by rolling him up after a hot bath, just as in the hydropathic practice.

The general result of this comparison would show, that warm baths are a milder remedy than cold ones, and applicable often when there is not sufficient power of reaction in the system to make it expedient to use the latter.

As we shall have no occasion again to mention the effects of simple cold-water bathing, this is a convenient place to say a few words about some of the applications of hydro-pathy. *Hydropathy* has suffered from its professors having too often undertaken to cure every disease by it, by their having practised it in opposition to regular medicine ; whereas, when intelligently used, it is as much ancillary to it, as any other bath treatment.¹ Its importance is greater in England than in most European countries, owing to

¹ The applications of hydropathic processes in the days of Currie to eruptive fevers, and at the present day to typhoid, are beyond the scope of this work.

the almost total absence of thermal waters of any importance.

The cold-water cure is more useful in functional nervous derangements than in any other—hence its undoubted value in hysteria, and in many of the complaints of women, when there is no organic disease. It is sometimes useful in hypochondriasis, but less certainly so. It is useful where there is excessive liability to catch cold, the result of increased nervous sensibility of the skin. It has been much lauded in rheumatism and in gout, but thermal waters are usually better suited for such cases, especially for the gouty condition. No doubt mainly by its sweating processes it is useful in lumbago, much less so in sciatica, that *opprobrium medicinæ*; in paralytic affections, and in all loss of power depending on any organic lesion, it is very disappointing; but it may be sometimes used with much advantage to remove the effects of sunstroke. It is not well suited for cases of enlargement of any of the abdominal viscera and chronic affections of the intestines, although I have known it exceptionally to be successful in chronic diarrhœa; such cases can be treated better in other ways. In these days, when, with Hebra at their head, sceptics have thrown doubts on the value of almost all our remedial agencies in skin diseases, the effect of continued immersion in water, and of simple water applications, is attracting attention. Lastly, there are a vast number of people with whom there is not much the matter, who still want change; and for them, the change to the diet usually enjoined, to the social intercourse of a large boarding establishment, to plenty of exercise in a

pleasant part of the country, procures advantages similar to those of foreign travel, or greater perhaps than those of a hurried visit to a foreign spa.

The contra-indications to this mode of treatment are a very lowered state of system—any general cachexy, organic disease, and especially of the pulmonary organs. If the power of reaction is not considerable, it should not be tried; it suits better under the age of forty or forty-five than above it. The too prolonged use of this treatment, to which hydropathic professors so often press their patients, is to be avoided. The more intelligent hydropathists themselves admit that they have contributed an unusually large number of patients to lunatic asylums.

But there are now few establishments in which the old hydropathic treatment is strictly adhered to. Usually there are baths in them of all descriptions, especially hot air and vapour baths; and when an intelligent man is superintendent, he varies the treatment, according to circumstances.

The best known establishments in England are at *Matlock*, *Malvern*, and *Ilkeley*; in Scotland, at *Crieff*, *Forres*, and *Wemyss bay*; while the best known one in Ireland is *St. Anne's*, near Cork.

Abroad, such establishments are far too many to be enumerated; but I name a few.

There are many excellent ones on the Rhine, as at *Godesberg*, *Rolandseck*, *Laubbach*, near Coblenz; two at *Boppard*, one at *Nassau*. There is one near *Ischl*.

In Switzerland may be mentioned those at *Albisbrunn*, *Engelberg*, *Rigi-Kaltbad*.

In France there are *Plessis Lalande*, *Divonne*, *St. Seine*, *Longchamps*, near Bordeaux ; one at *Vichy*.

I have only mentioned one establishment near the great capitals, M. Fleury's, as patients who wish to make trial of hydropathy had better have the full advantage of country air.

A few words must be said respecting modes of using baths. Something has been already said of the water in a bath being in motion or not, and the effect this has on the temperature of the body, and the layer of water next it. It is a question whether one should remain motionless or not in a bath. On the whole, in a warm bath one feels more inclined to rest than to movement ; indeed, it is often necessary to guard against falling asleep. In colder baths one is more inclined to move, although motion increases the action of the cold water. The duration of a bath varies from a quarter of an hour to one hour, or even longer ; but the long immersions common formerly, and still practised in many parts of Switzerland, are not desirable. Old people bear protracted immersion in warm baths better than young ones.

When the water is projected with any force against the body, as in a wave of the sea, the mechanical effect of the blow causes a shock, or irritation and stimulation, which is often useful in nervous affections. In many baths, by the introduction of gas and by other contrivances, a sort of imitation wave-baths has been produced : very powerful remedies are cold affusion and dipping in waves, especially when the water is cold. The former is most practised after vapour baths, the latter in sea-bathing.

But *douches* have assumed such an important share in bath treatment, that a few more words must be devoted to them. Thickenings of joints, whether the result of rheumatism or of gout, are constantly treated with advantage by means of douches, which are, in fact, spouts of water of various sizes and temperatures, applied with more or less force, for a longer or shorter time, against the particular part. The operation of the douche consists in the stimulation of the skin and parts beneath it, leading to quickened circulation of the capillaries of the part, which favours the absorption of unhealthy deposits, wakes up the slumbering activity of the tissues, and helps to remove congestions from the more deeply-seated parts. The spot consequently to which the douche is applied, must not be in a state of irritation or of inflammation. Care must be taken as to the part of the body to which it is applied in nervous and excitable people. The douche is not to be used continuously—it may be employed for two or three minutes, and then used again after a pause of some minutes ; but in all this much depends on habit, and on the patient getting accustomed to it. The alternation of hot and cold douches, which has somehow got the name of the *Ecossaise*, is much practised in many baths, and is a very powerful remedy, from the strong local action and reaction which it causes ; more local douches are used in the form of injections, and may be often applied with advantage. Ascending douches may be used for the intestinal canal or the vagina ; but they should be employed with care : as it is, they are apt to be resorted to much too freely, and they may prove injurious in uterine

complaints. A variety of *douche* is that which is applied to the eye ; it requires to be handled carefully.

The slow process of *drop baths* has been followed in some cases, when a single drop of water falls, from a height of about thirty feet, on the particular part every few seconds, while the patient sits in the bath ; the effect of hot or cold water in such a case being pretty much the same. It causes a considerable shock, and cannot be borne for more than a few minutes at a time.

Finally comes the *shower bath*, the one with which we are most familiar in England, the one most generally applicable for constitutional purposes, and one of very great value. Falling on the head, it produces a strong effect on the nervous centres. The general nervous periphery is best stimulated by the multitude of jets projected against every portion of the body by an ingenious circular arrangement of modern invention, to be found at most baths.

To all these modes, which have been barely enumerated, of acting on the capillary circulation of the cutaneous surfaces with water, must be added *dry rubbing*, which is far best practised by bath attendants, and the various forms of mulling and kneading the muscles, stretching the limbs and cracking the joints, which are borrowed from the East, and of which advantage may be taken at some of the continental or Turkish baths. This local treatment is no mean portion of the successful management of old thickenings of joints and sprains ; but it is only at some baths that they understand the practice of it thoroughly. The two Aixes, Teplitz, and Wildbad are probably among the best in this

respect. The pleasant, luxurious mulling and kneading of a Turkish bath are not all that is required for thickened joints.

We have seen that, though we cannot compel healthy skin to absorb water, unless in very small quantities indeed, we can undoubtedly make it excrete water, and something with it, or perspiration in more than the natural quantity. This process of *sudation*, or of causing increased cutaneous transpiration, is involved in so many bath proceedings that it requires to be alluded to.

Perspiration is commonly described as insensible or sensible, according as the water escapes unseen, or is observed in the form of moisture on the skin. The relation of its two forms to each other has been compared to that of clouds to rain.

There is considerable analogy between the functions of the kidneys and those of the skin, not only in giving off water from the system, but in excreting urea and common salt. The skin and the kidneys sympathise with each other. Increased cutaneous transpiration diminishes the secretions of the kidneys, and *vice versâ*. This is familiarly shown by the effects of change of temperature on the system. In cold weather the kidneys do more work, in hot the skin does more. When those who have resided in tropical countries return to Europe, extra work is thrown on the kidneys, owing to the great diminution of the cutaneous transpiration in the colder country, and it takes some time, months or even years, before their organs get accustomed to the change.

The quantity of perspiration depends on the amount of water drunk, on the state of the air, on the amount of exer-

cise taken, and also on the constitution of the individual. Taking 30 ozs. of perspiration as the daily average, $\frac{1}{3}$ of an ounce would be urea and other peculiar solids, while the amount of them contained in the urine is 2 to $3\frac{1}{2}$ ozs. daily. In 100 parts of perspiration there are about 97.5 of water, 1 to 2.5 parts of solid matter, consisting of odoriferous matter, and of the secretion of the sebaceous follicles, urea, a little common salt, and some phosphates. About one-fourth of the solid matter is said to be urea; nearly 150 grains of that substance are, it is believed, excreted by the skin daily.

But a certain amount of respiration is also performed by the skin. While the quantity of water usually excreted by the skin is at least double that given off by the lungs, $\frac{1}{30}$ to $\frac{1}{66}$, as much carbonic acid is given off by the skin as by the lungs, and a nearly equal amount of oxygen is absorbed; a minute quantity of nitrogen is also taken in by the skin.

It would thus appear that the skin eliminates water and effete matter, and aids in the respiratory process; and one use of perspiration is believed to be, to regulate the temperature of the body.

While the average loss to the system by perspiration is considered to be 30 or even 40 ozs. in the twenty-four hours, calculations have been made as to the loss in weight from violent sudation. It has been calculated that a man in a Russian bath loses about half an ounce every minute; and it has been found that a man has lost two pounds in forty minutes. The average loss by the use of a Russian bath may probably be set down at one-half to three pounds. In

this way a considerable effect may be produced on the blood by the abstraction of a large amount of water, but it is made up for almost immediately from the fluids that we drink. Some have calculated the amount of fluid that may be lost by perspiration at a much higher rate.

It has long been a popular notion, both in and out of the profession, that specially noxious as well as effete matter is got rid of by the system through the perspiration; and of late years it has been said that in some diseases large quantities of uric acid are excreted by the skin. The proof of this, however, is very defective. Such exudations have very generally been found, on examination, to consist of desquamation of epidermic cells. Dr. Garrod, a great authority on the subject, has never been able to detect uric acid on healthy skin. Nor in cases of metallic poisoning has the presence of metal ever been detected in the cutaneous excretions, although confident assertions are to be found in books that lead poison is detected in the system by the discoloration of the skin on immersion in a bath of sulphuret of potass. It is too generally assumed that all perspirations in disease are efforts of nature to eliminate poisons from the system; but this cannot well be alike the case in the sweating of rheumatic fever, in a fit of ague, or in the hectic of phthisis. Perspiration is often the accompaniment of changes called crises, but not necessarily their cause or their effect. While, however, much on this subject is uncertain, and while no theory of their production is satisfactory, no one can doubt the prejudicial effects of sudden checks to the cutaneous exhalation, even if the injurious consequences of

suppressing the perspiration in animals had not been experimentally proved by applying varnish over their skins ; and to restore the natural function of the skin, when it is believed to be suspended, has always been one of the admitted principles of therapeutics.

I believe that we are not generally aware that men who are engaged in mechanical labour, which induces copious perspiration, and thus washes off some of the secretions from the surface, stand less in need of baths than people of sedentary habits.

Before leaving the subject of the external applications of water, a few words may be added on the *injurious effects* of hot and cold baths when used injudiciously, although something has been already said of the indications and the contra-indications for their employment. The soporific effect, both of hot and lukewarm baths, must not be overlooked ; this effect is very constant, and has frequently led to death by drowning in the bath. In Italy, music used to be played during the bath to counteract this tendency. The effects of very hot baths are vomiting, swimming in the head, fainting, congestion of the brain, and, in some rare cases, apoplexy. In such cases, after death there is usually accumulation of blood in the right side of the heart, and the whole symptoms seem to point to paralysis of the heart's action. It is therefore at once evident how cautious people should be in the use of very hot baths, who have weak hearts or any obstruction to their circulation : fat men, and those who are full-blooded, and boys predisposed to epilepsy, as well as pregnant women, should avoid them.

It is interesting to find that the primary morbid appearance after death from extreme cold, is also to be found in accumulation of blood on the right side of the heart.

Though sleepiness is not likely to follow soon the shock of immersion in a very cold bath, still it is one of the effects of exposure to great cold. The risk in cold baths is congestion of the internal organs, as is often indicated by the lips getting blue, and even in some cases by bleeding from the nose; extremely cold baths are therefore very unsafe for all in whom a tendency to any internal congestion is suspected: they are not adapted for the old or for the very young, or for women at certain periods. They are always dangerous when the system is exhausted by fatigue. I have often known them bring back an ague.

CHAPTER V.

INTERNAL USE OF WATER.

As all well-cures imply the use of a larger than usual quantity of drinking-water, it is impossible to overlook the share which the water, apart from its mineral constituents, has on the system. The average quantity of fluid taken in by a healthy man, in various shapes, in the twenty-four hours, amounts to about four pints ; some take less, some a good deal more.

The *important function of water* in the economy is apparent from such facts as these, that it supplies about three-fourths of the whole constituents of the body, and that nineteen-twentieths of the circulating fluids are water ; from twelve to twenty-four pounds of water would seem to be poured out daily with the excretions into the intestinal canal, the greater part of which is re-absorbed from it. The secretion into the alimentary canal takes place from the arterial and from the venous blood ; the re-absorption is effected by the lymphatics and the extremities of the vena portæ. The whole amount of water lost in the perspiration and in the urine, and through the lungs, from four to five pounds, is not

to be compared with the daily amount poured into the intestinal canal ; none of the excretions contain less than 86 per cent. of water, and some of them more than 98. One part of the water is excreted through the skin and lungs, and is accompanied by various matters, but by no salts. Sweat, urine, and milk, again remove peculiar organic compounds, and especially a considerable quantity of inorganic salts along with water ; while the third portion of water in the system forms the foundation of those secretions, the constituents of which are re-absorbed, altered or unaltered, such as saliva, bile, pancreatic and gastric juices.

The rate at which water, which has been just swallowed, is absorbed, varies according to the quantity drunk, and its temperature ; for the more nearly it approaches the temperature of the blood, the more easily is it taken up. If the stomach is empty, absorption takes place very quickly ; but if too large a quantity is drunk at once, its absorption is retarded. Water is taken up mainly by the stomach. The quantity absorbed by other portions of the intestinal canal is much smaller, and absorption in them takes place more slowly. The greatest portion of the water is taken up by the veins of the stomach, and is immediately conveyed to the vena portæ, the blood of which, under ordinary circumstances, contains more water than other venous blood. If too large a quantity of water is drunk, there may be a feeling of oppression and of weight. Absorption may then take some time, and reach its maximum two or three hours after the fluid has been taken into the stomach, as its excretion through the kidneys appears to take place after about such a

period. The freer the water is of saline constituents, the more readily is it absorbed. The quantity that has occasionally been drunk, not including what has occurred in cases of diabetes, is astonishingly great. For instance, about twenty-four pounds daily has been reached in some hydropathic establishments, and many extraordinary stories are told of the quantity of water that has been drunk at various wells.

The effect of swallowing these large quantities of water is somewhat uncertain; little of the water seems to pass through unabsorbed. These large draughts have occasionally caused constipation, but more often a tendency to diarrhœa.

It appears to be pretty certain that the quantity of water in the blood varies with the quantity of water taken in or given out by the system, but the variation of this amount is small and imperfectly ascertained. The excretion of water usually begins very soon after it has been taken in, and continues for two to four hours. All water drunk does not pass through the kidneys. The proportion passed by them has been stated at as 10 to 11. The quantity of water excreted depends much on the state of the body, and what its wants at the time may be. Water-drinking makes the urine more abundant and relatively thinner. There is some difference of opinion as to whether it increases the excretion of urea or not. On the whole, however, it seems to be ascertained, that the more the water drunk, the more the urea excreted, and along with this there is a diminution in the quantity of uric acid. As to inorganic constituents of the urine, chloride of sodium, phosphoric and sulphuric acids appear to be

increased, for a time, by drinking large quantities of water, and then to be diminished in amount.

The effect of water-drinking on the excretion of carbonic acid by the lungs has not been determined. It usually increases the insensible transpiration, but this depends a good deal on the external temperature. Much water-drinking very markedly increases perspiration, especially when it is aided by high temperature of the water or of the air, by the heat of bed, or by active exercise. According to Mosler's experiments, the excretion of solids through the kidneys was greater after drinking water gradually, than after drinking it rapidly. The interstitial change of tissue was favoured by high external temperature, and by exercise ; and the use of equal quantities of warm was more effective than that of cold water.

To conclude this abstract of the physiological action of water, the water which circulates in the blood is the motive power of the nourishment of the secretions and of the change of tissue in the part. The secretions which are poured into the intestinal canal, and which are destined to be again absorbed, are employed in the transformation, fluidification, and assimilation of articles of food. "The water," says Lehmann, "which is poured out with the bile must not be overlooked as a solvent for the soluble parts of the chyme ; the blood of the veins of the liver is much poorer in water than that of the vena portæ. Water has to make a frequent circuit from the stomach into the vena portæ, from it through the liver and biliary passages, and back into the alimentary canal. It thus contributes to the

gradual fluidification of the chyme, and the more so as this water, owing to the bile acids becoming insoluble, always loses again in the alimentary canal the substances which have been dissolved by the agency of the liver." The fact of the increased secretion of bile from water-drinking is probably connected with the absorption taking place mainly through the stomach and vena portæ, and we may in this way imagine how it may assist the abdominal circulation.

Again, too small a supply of water must react on the animal heat, on the absorption in the alimentary canal, and on the secretions, and act generally unfavourably on the digestion ; while too much water-drinking produces a poorness of the blood in soluble salts, unless plenty of nourishment is taken. A certain degree of water cachexy may thus be induced by an immoderate use of water, and one of a more lasting character than the so-called well-fever.

Coming now to the *therapeutic* effects of water, its first one is probably, in a great degree, mechanical. It expands the stomach and the intestines, the lymph and blood-vessels, the biliary passages, the bladder, and it may be conjectured that this expansion helps to relieve the congestion of the liver, or other viscera ; also that it may aid materially the passage of gall-stones ; in the same way, after free drinking of water, gravel may be more easily passed from the bladder. Water dilutes the contents of the alimentary canal, and is so far laxative. It dilutes them mechanically ; and it also serves to dilute the contents of the lymphatics and of the veins ; it facilitates the capillary circulation, and may thus be supposed to relieve the heart and congestions generally ;

it also dilutes the bile and the urine. Further, by its solvent power, it materially assists digestion. It is quite possible that the solvent power of water may even extend to some unhealthy albuminous deposits. Water, by making the secretions more abundant, makes them bring more matter into circulation, and removes more decayed cells and effete matter: it thus quickens the change of tissue. As the appetite is generally improved, there is an inclination to take more food, and thus there is increased activity and a certain renewal of the system.

On such principles we can suppose that in some diseases, as gout, and perhaps rheumatism, large quantities of water are useful in washing out lithic acid. Cadet de Vaux's cure of gout, founded on the effects he had seen produced by drinking the waters of Plombières, is well known. He directed forty-eight glasses, of 6 to 8 ozs. of water, of the temperature of 50° to 60°, to be taken successively, one glass every quarter of an hour. Water-drinking has been especially in repute in chronic metallic poisoning; it is easy to see, as the liver is the great seat of most metallic poisoning of the system, how the free use of water may facilitate the elimination of metallic salts, by increasing the amount of the secretions, especially of the liver, and aid also by its action on the kidneys and skin. Its use in the elimination of mercury naturally led to its being also employed in syphilis, but it has not been employed in it with any particular advantage.

The operation of *hot and of cold water* is somewhat different. It seems probable, that the one has to be lowered,

and the other to be raised to about blood-heat before it is absorbed. Probably cooling down takes place more easily than heating up ; but experience shows that overfilling the stomach with water, whether hot or cold, retards its absorption. Cold water acts first as a stimulant, then exhausts the irritability of the stomach, without, however, removing its causes. Warm water is a stimulant, though a less strong one, and also diminishes irritability ; and reaction is less likely to ensue after it, than after cold water.

Cold water is extremely useful in atony of the stomach ; in its coldest form it deadens its irritability, as in the shape of ice in obstinate vomiting. In small quantities, it acts as a stimulant to digestion ; while if the quantity is considerable, it impedes that function. The swallowing of cold water to any considerable amount retards the circulation. It has been observed to bring down the pulse from eighty to sixty-two beats. A tumbler of cold water, the first thing in the morning, is an excellent stimulant of regular intestinal action.

Warm water, again, is very useful in painful affections of the stomach and of the lower portion of the abdomen ; it quickens the circulation, when that is wanted, or when perspiration or any bleeding has to be encouraged ; it is preferable to cold, when it is desirable to make the contents or the secretions of the alimentary canal more fluid, and possibly when there is a hope of producing the absorption of unorganized deposits.

The ancients appear sometimes to have used plain hot water as a drink at their banquets, although probably in

their thermopolia hot water was chiefly used for the preparation of drinks.

Dr. G. Keith, of Edinburgh, tells me that he has found hot water very useful in many gastric and so-called bilious attacks, also in catarrh of the stomach. In chronic cases he has found it most useful in exciting the action of the liver; a tumbler night and morning he finds certainly more efficacious than most cholagogue medicines. Hot water was recommended by the Greek and Roman physicians in cholera.

Griesinger, whose recent death medical science deplores, found small draughts of hot water useful in bronchial and in laryngeal catarrhs; and it is quite an open question, whether the benefit derived in such cases from weak alkaline and sulphur springs, does not result simply from the drinking of warm water.

Cold water is generally indicated when the temperature of the body is unnaturally high, and may be administered freely in most febrile complaints; cold, and for that matter, hot water has been, like almost every other substance of the *Materia Medica*, proclaimed a cure for intermittent fever.

If the powers are too low, and in anæmic conditions generally, it is not wise to administer cold water systematically; and it is a familiar fact that, when the system is exhausted by exercise, a warm drink is more refreshing than a cold one.

Certain constitutional effects produced by the use of water may be here conveniently noticed.

Until very recently, much importance was attached in all

bath treatment to the production of a *certain febrile condition* and certain rashes or eruptions, which were looked on as proofs both of the system being saturated, and of the occurrence of a crisis. These effects appear to be produced as readily by common as by mineral waters. For convenience sake I shall quote the effects of Buxton and of Gastein, both of them purer than ordinary drinking water. It has been said of Buxton, that its waters, though not drunk to a larger amount than $4\frac{1}{2}$ pints daily, have sometimes affected the head with a sort of inebriating giddiness and sense of fulness and drowsiness, on first drinking them. The following are some of the symptoms recorded at Gastein :—Painful feeling of drawing in the limbs, excitement of the pulse, sleeplessness, seeing sparks of light before the eyes, alternate shivering and heat, or something like an ague fit—one or two hours' feeling of cold, followed by heat and sweating. This condition is often associated with pretty sharp diarrhœa and rashes, called *Bad friesel* or *la poussée*. But much disturbance of the system is in no way necessary to a cure. Braun has written so sensibly on the subject, that I transcribe his remarks :—

“From misuse as to quantity and temperature of the water drunk [and he might have added from too long continued and generally from too hot baths], there often arise various shades of discomfort, which vary in different individuals, and have most inconsistently been called well-fever. But just as there is no nymph of the well, so is there no fever of it ; and what is understood by that term, are conditions induced by over-doing the process of cure, often connected with diet

and change of mode of life, but attended by no certain and constant symptoms. The flooding the stomach with water very easily excites dyspepsia and gastric catarrh ; and the peculiarities of mineral waters, such as their heat or coldness, the presence of various salts and gases, combine to modify this influence. The digestion fails, nutrition is impeded, the skin is attacked by different eruptions, especially by small boils, and sometimes the symptoms of the original disease become aggravated in sympathy. The violent sweat-producing processes, whether hydropathic or otherwise, are particularly apt to bring out rashes."

These feverish symptoms and eruptions, though often considered by the patient to be highly desirable, are by no means to be wished for. They interrupt the course of cure for a time. The treatment may have to be stopped for a day or two, but it is soon possible to go back again to the well, drinking it in smaller quantities, or to the baths, probably using them of a lower temperature, and staying in them for a shorter time.

It is presumed that water will not be drunk to excess by patients under regular treatment ; but there is no doubt that inordinate drinking of it may *prove positively injurious*. Large quantities of common hot water and of mineral ones have at times caused convulsions, delirium, stupor, and death. But much more frequent and familiar to all, are the dangers of drinking large quantities of cold water, especially when the body is exhausted by previous exercise. Instances of sudden death from this are known to most people. When the death is instant, there is often sudden pain in the head,

fainting and apoplexy. The familiar instance of pain in the forehead experienced by some people, immediately on swallowing ice, has some points of analogy with these sudden seizures. Or there may be difficulty and spasm of breathing and hæmoptysis preceding the fatal result. When death is not so sudden, there may be violent pain in the stomach, vomiting, or purging; or peritonitis or pleuritis may occur.

With reference to some of the general results of water-drinking, the observation of Bernard Gordon, a professor at Montpellier, made six centuries ago, may be worth quoting : "He who drinks too much cold water will not escape disturbance of the mental functions and premature old age." What will our modern water-drinkers say to this ?

CHAPTER VI.

OF MINERAL WATERS GENERALLY.

HITHERTO we have talked of water as if it were chemically pure, but even the best drinking water contains a certain minute quantity of mineral salts, or of organic impurities. Indeed, water not perfectly pure is pleasanter to the taste than distilled water, and it always tastes mawkish, in the absence of some atmospheric air, and of some slight amount of salts.

There are some wells which supply a water too much impregnated with mineral matters to make it fit for common use, but which is still found to be useful in the treatment of disease. There are also springs, the heat of which exceeds the average temperature of other wells in the same place. Such waters are called mineral ones; and these definitions, though open to objections, will answer for practical purposes. It is generally considered, that waters with more than five grains in the pint of solid matter, should be counted mineral, but no such proportion can arbitrarily be fixed, for there are good drinking waters that contain nearly as much, and some of the indifferent mineral waters that contain much less.

The number of elementary substances, that have been found either free, or usually in combination in mineral sources, is very large, as appears from the following list. The most minute portions of these substances are now detected by spectrum analysis :—

Oxygen and ozone, nitrogen, chlorine, hydrogen, carburetted hydrogen, carbonic acid, ammonia ; hydrosulphuric, hydrochloric, sulphuric, sulphurous, nitric, nitrous, phosphoric, antimonic, silicic, and boracic acids ; calcium, sodium, potassium, bromine, iodine, arsenic, sulphur, lithium, rubidium, cæsium, barium, strontium, magnesium, aluminium, manganese, fluorine, iron, copper, lead, zinc.

The *Materia Medica* list of the constituents of mineral waters is thus very long, and it would be no easy task to appreciate the influence of each of these substances, if it were necessary to do so ; but although bath doctors have with pride boasted of the number of substances entering into the composition of their waters, and have held this out as a recommendation, the active principles of mineral waters are comparatively few ; they exist in very varying quantities, sometimes scantily, sometimes abundantly, while the other constituents are commonly found in mere traces ; and it is very doubtful whether such minute quantities modify the action of the waters—if they do, it is in a way quite beyond our ken.

The really important constituents are, carbonate and sulphate of soda, chloride of sodium, carbonate and sulphate of magnesia, carbonate of lime and carbonate of iron and their sulphates, sulphurets of sodium and of lime,

bromine and iodine, carbonic acid, hydro-sulphuric acid and nitrogen.

It may be borne in mind, that we cannot be said to know very accurately, the real chemical constitution of any but the simpler mineral waters. The chemist finds by his analysis bases and acids, but he cannot tell us with absolute certainty, how they are combined. In fact, the chemical composition assigned by the analyst to a particular water, often depends on his theoretical views on chemistry. Although some slight differences of composition and of temperature have been detected in springs at different seasons of the year, yet it is extraordinary how long their character has remained unchanged; in many instances, certainly since the commencement of the Christian era.

But besides having mineral constituents, many waters, especially thermal ones, deposit large quantities of a glairy substance, which has received the names of baregine, glairine, and of zoogene. This substance, though of no importance in medicine, unless perhaps when being present in large quantities it gives softness to the water, is essentially organic, and is interesting to us at this time, when protoplasm, to which it bears some analogy, is the subject of so much discussion.

Baregine, to the naked eye, is a jelly-like substance, in which some filaments are apparent. On microscopic examination it has been resolved into two parts, one amorphous and unorganized, usually colourless, and when calcined giving an odour of ammonia, and leaving a little ash of silica. The other is found to be made up of low organic

forms, differing in different wells ; the diatomaceæ being abundant in some, in others confervaceæ, forms resembling oscillatoriaceæ, nostochineæ, also anabænas, some of these oscillatoriæ forming very beautiful and regular net-like figures on stones which they envelope. Some writers are of opinion that the first or jelly-like substance, out of which these oscillatoriæ grow, may be resolved into agglomerations of hydrocrocis and leptothrix. However this may be, the production of this glairy substance in mineral waters is a very curious phenomenon, not satisfactorily explained. It is believed that it is formed at great depths, and that it is only after it has been exposed to the air that those low forms of vegetation appear. They seem to bear a certain relation to the lowering of the temperature of the springs, and in some cases to the amount of sulphur present. But this interesting subject, as it has no bearing on the curative effects of water, cannot be pursued further here.

The mineral waters that first arrested the attention of men, and which in early times were usually dedicated to various divinities, and in more modern ones to different saints, were those which differed most palpably from ordinary water, and those were warm or thermal springs, and sulphur ones. The heat in one case, and the smell in the other, attracted notice. Mineral waters occur in almost every portion of the world, but we are mainly concerned with those of Europe.

It is of thermal and other springs in Italy and Greece that we have the earliest accounts. Herodotus, for instance, notices the fountains of the Tearos in Thrace ; some were hot

and some cold, and they cured skin complaints of men and of animals. Some of the waters of Ischia are probably as hot as those of Kamschatka and of Bishisht in India, probably the hottest in the world, reaching nearly to 212° . Thermal springs are almost absent from Great Britain and Ireland, Denmark and Belgium; tolerably abundant in Germany and Switzerland, much more so in France, Spain, Portugal, and in Italy. Thermal springs vary much in the quantity of water they supply; probably of entirely natural sources, the Sprudel at Karlsbad and the well at Dax in the Landes yield the greatest supply. That of the latter was calculated at a ton and a half of water per minute. Thermal springs occur at every height from the level of the sea, or nearly so, in Ischia and Iceland, up to 12,000 feet in the Cordilleras, and 16,000 feet (from beneath a glacier) in the Himalayas.

The number of sulphur wells in all parts of the world is great; the largest group in Europe, by far, is the Pyrenean one, especially if we include those on the Spanish as well as on the French side of the chain; and if we were to include every spring which gives forth a slight odour of sulphuretted hydrogen, the number might be indefinitely increased.

The other kinds of mineral water which were early noticed for their sparkling bubbles, their yellow deposits, their salt or bitter taste, need not be dilated on here.

Springs of mineral water arise under all circumstances in open plains and in broken country, but undoubtedly they prefer the latter. They, and particularly thermal springs,

seem to be most common in volcanic districts, at points of great displacement of strata, or at the junction of stratified and unstratified, or of sedimentary and crystallized rocks ; a great many of them occur in narrow, picturesque valleys, such as Plombières, Ems, and Karlsbad, and this picturesqueness adds materially to the popularity and to the absolute utility of the springs. This in the main, although there are also disadvantages connected with such situations.

Mineral waters may be grouped in a variety of ways,—for instance, according to the district in which they occur ; and in this way the Pyrenean, the Auvergne, the Nassau, and the Bohemian ones, would each form natural groups.

It has again been attempted to connect them with geological formations, and the waters of the Pyrenees have been subdivided on this principle, and they have been classified as they occur in formations of different ages. Thus springs of one character were supposed to occur in primary rocks, of another in tertiary, and of a third in the neighbourhood of extinct or of active volcanoes. Even if such a classification could be carried out, it would be of no use to us, as theoretical notions regarding the origin of a well can never have any bearing on its practical use.

A much more practical division is into cold, and hot or thermal ; and thermal springs may be considered to be those the temperature of which is higher than the mean temperature of the place where they rise. Of the conditions influencing thermality little is known. In a general way it is believed to be connected with chemical action going on in the rocks which the springs have to traverse, and with the

depth from which the springs arise, as the fact of the central heat of the earth might lead us to suppose. The distinction between hot and cold waters corresponds very closely with that of water used for baths, and of waters used for drinking ; but many mineral waters are used for both purposes, so that this division would not be always applicable.

It has been most commonly proposed to class waters according to their chemical composition ; and on the whole this division is the most valuable one, as affording some clue to their therapeutic action ; but nothing like a chemical classification has yet been found, that is not open to many objections. The extremely complicated composition of many springs stands in the way of satisfactory classification.

But as such classifications are an important aid to the knowledge of their properties, and also supply general views of their comparative constitution, I give two of the more popular French ones :—

Sulphur Waters	{ Sulphuret of Soda.
	{ Sulphuret of Lime.
Common Salt Waters	{ Chloride of Soda.
	{ Chloride of Soda bicarbonated.
	{ Chloride of Soda sulphuretted.
Bicarbonated Waters	{ Carbonate of Soda.
	{ Carbonate of Lime.
	{ Mixed Carbonates.
Sulphated Waters	{ Sulphate of Soda.
	{ Sulphate of Magnesia.
	{ Sulphate of Lime.
	{ Mixed Sulphates.
Iron Waters	{ Bicarbonate of Iron.
	{ Sulphate of Iron with Manganese.

CLASS.	GENUS.	SPECIES.
Carbonated	{ Soda base.	
	{ Earthy base	{ Ferruginous. Non-ferruginous.
Sulphuretted and Sulphated	{ Soda base	{ True Sulphur. Degenerated Sulphur.
	{ Lime base	{ Simple Sulphates. Mixed Sulphates and Sulphurets.
	{ Magnesia base	Sulphated.
	{ Iron base	Sulphated.
Chlorides	All a Soda base	Simple, with Iodine.

The next is a German classification :

- | | |
|-----------------------------|---|
| I. Alkaline | { 1. Simple Carbonated.
2. Alkaline.
3. Alkali and common Salt. |
| II. Glauber Salt. | |
| III. Iron | { 1. Pure.
2. Alkaline and Saline.
3. Earthy and Saline. |
| IV. Common Salt | { 1. Simple.
2. Concentrated.
3. With Bromine or Iodine. |
| V. Epsom Salt. | |
| VI. Sulphur. | |
| VII. Earthy and Calcareous. | |
| VIII. Indifferent. | |

There are many points in favour of a mixed physiological and therapeutic classification, although an idea once thrown out, that the constituents of mineral waters might be discovered by watching their effects on the system, carries this notion too far. Thus the digestive and urinary organs are specially affected by alkaline waters; the liver and the alimentary canal by saline ones. The skin and, according to continental authors, the mucous respiratory membrane

are much influenced by sulphur waters, while a special action on the blood has always been attributed to ferruginous sources.

Still more generally they have been divided according as their action is stimulant or depressing. But the same waters may act in either way, according to the mode in which they are employed.

I do not think that the simple empirical use of the waters has produced results that would justify us in classifying waters according to the diseases they cure, or their apparent general effects on the system. Besides, it is found that the same source cures the most different diseases ; and that similar diseases are often cured by very different waters.

The classification here adopted is mainly the German one quoted above.

In Germany the majority of the mineral springs are public, while in France the majority are private property ; they are commonly farmed out to companies, with whom their general control and management rest : the State frequently appoints bath physicians and bath inspectors, sometimes with and sometimes without a salary. The appointments of inspector and assistant inspectors, and the official status conferred by them, often create a good deal of jealousy in the minds of the other medical men practising at the bath. The office is very apt to become a sinecure, and an effort is being made in France at present to do away with it. At most baths, if you stay more than a few days, you are called on to pay a small tax for keeping up the establishment or its band. In Spain you cannot drink

the waters at all, without making a small payment first to the doctor of the bath.

The arrangements for drinking mineral waters are different at the various wells and mineral stations. In some cases the wells are open and surrounded by light railings; in others they are covered in by pavilions or miniature temples. In some places, where the supply is not very abundant, and the demand is great, the drinkers have to pass in between railings, such as are used at the entrance of theatres.

The pleasantest arrangement is, when the water is served out fresh, as it issues from the open wells at Homburg, by active, good-natured girls; another common one is, that a rod, with an arrangement for holding half-a-dozen glasses at its end, is dipped down into the well; and the least pleasant or natural way is, when it is pumped up by a special apparatus. It is now usual, and the most convenient arrangement, not to bring your own glass, but to take one supplied to you; it is often necessary to pour the water backwards and forwards between two glasses to cool it, and still more to get rid of any great excess of carbonic acid. This is an operation which is very neatly performed by the nymphs of the fountains. The glass usually contains from about 5 to 8 ozs., but there is no uniformity in this respect among the different spas. This is very unfortunate, for, in appreciating the therapeutic value of waters, an exact knowledge of the quantity of a water drunk is very important. At many wells the ladies make a point of drinking the waters through a glass tube, to prevent the waters injuring their teeth. There is really not much risk of this, but there can

be no harm in using the tube, especially if the spring is very cold. In some instances, when patients suffer from laryngeal or bronchial affections, they are directed to drink their water diluted with milk or whey, or gum water. In former times it was the universal usage to chew aniseed or similar substances between the sips of water.

The bathing arrangements are usually under the superintendence of a local inspector, from whom tickets for baths are procured. You get a set of baths cheaper than single ones. There are first and second, and often third class baths; in various places too, indeed in most, as in Wildbad, there are baths for the poor.

Austria and other German States have baths for their soldiers; France no fewer than ten of them: counting six in France, one in Corsica, two in Algiers, and one in the Island of Bourbon. And here the question naturally suggests itself, whether England might not do something in this way either at home or abroad. There is not a doubt that Bath is quite as efficacious as most of the foreign calcareous thermal baths. India, Government has been very active in selecting sanitary stations in the mountains, and it encouraged an investigation of the mineral waters of India, which I had the honour to suggest in 1853. But the inquiry had little result, mainly because Indian, like English practitioners, take slight interest in the subject. It can scarcely be said, in spite of one or two creditable exceptions, that any serious attempt has been made to utilize the waters of India, though they are much employed by the natives.

Some of the buildings set apart for bathing in the older spas are, as at Plombières, of great antiquity ; although I believe that at no station, unless at Wiesbaden, are any actual Roman remains now employed. As a general rule, new baths, like new hotels, are pleasanter than old ones. Some of the most modern and complete establishments I have seen, have been at Plombières, Aix-la-Chapelle, Wildbad, Aix, Vichy, Nérès, Cauteret, Bath, and the new bath at Karlsbad ; but fresh excellent buildings are springing up everywhere.

Baths may be divided into single and common ones ; the first are far the most convenient and most employed : they are ranged in cabinets usually opening off each side of a long corridor or passage ; they are commonly metallic tubs, in some instances wooden ones, into which you step, or they are depressions in the floor of the bath-room, lined with flags, marble, or porcelain, according to the class of the bath, into which you descend.

These single baths are greatly to be preferred to the common baths, or piscinæ of every size, which are to be found at most spas. In them it is necessary to wear a light shirt, and they are often crowded. There is a prejudice against them on the score of possibly catching contagious diseases in them,¹ but care is taken to exclude those suffering from such affections ; and, as a matter of fact, I believe that there is no case on record of any one having ever been so infected. The convenience of, or rather the necessity for the

¹ In old days of the plague, persons coming from infected places to Plombières were liable to capital punishment.

piscinæ, is in stations, as Barèges, where the supply of water is scanty ; but if they are used at all, there should be a sufficient supply of fresh water through them.

Up to a very late period, common baths for men and women were usual ; but this most undesirable practice of the two sexes bathing together, has been pretty nearly abandoned. It is still kept up at Leuk, where one of the sights for visitors is, to see men and women in long dressing gowns sit in water for hours, with drinks and card tables floated to them on trays. The nearest parallel to this may be found in Japan, where men and women bathe promiscuously without any coverings.

CHAPTER VII.

ACTION OF MINERAL WATERS VIEWED GENERALLY.

BEFORE entering on the examination of particular classes of water, I shall offer a few remarks on some points that are common to many of them. The action of water of various degrees of temperature applied externally or taken internally, or both, constitutes a very important portion of their influence. Such general action of water has already been pretty fully inquired into. The further operation of mineral waters depends upon their mineral or gaseous constituents. In their solid constituents mineral waters resemble ordinary fluid medicines. They differ from them, unless in the case of a few of the purging waters, in being much more diluted, in their greater complexity (at least in these days of a simpler *materia medica*), in the frequent presence of minute quantities of a great many salts, and very generally in the presence of larger quantities of gas.

Mineral waters are presented to the stomach, or applied to the cutaneous surfaces, and a small portion of their gaseous contents is necessarily inhaled during either process. The operation of waters by the stomach is the same as that

of ordinary medicines, allowance being made for the greater degree of dilution, and the larger bulk of water swallowed. As to the first, though the quantity of salts present is often small, and that of arsenic and other substances sometimes almost infinitesimal, still they are appreciable quantities, and not the imaginary ones that are sometimes theoretically prescribed.

The quantities of water sometimes drunk are enormous ; and even in the case of indifferent waters this may not be so innocuous as it was in the following instances :—

At Contrexeville there are patients who steadily drink from thirteen to twenty-two pints. At Pougues, a man has been seen to drink ten pints at once. A peasant, aged eighty-two, used to come for many years to Euzet for three days, and drink the first day 50, the second 100, and the third 150 glasses of the sulphur water, the maximum being at least sixteen or eighteen quarts. Such examples might easily be multiplied.

Wonderful effects are frequently attributed to drinking *thermal* waters of the simplest composition, of which the following is an example :—

The waters of Eaux-Bonnes contain a minute quantity of sulphuret of sodium, a very little silex, and rather more sulphate of lime. The extreme activity of these waters makes it necessary to commence their use with great care. One begins with half a glass, gradually increasing to four or five daily. But there are some patients so impressionable that they can only bear them in spoonfuls. Scarcely has the water reached their lips, before they already feel the most of

its effects. Therefore no one now will follow the advice of Bordeu, who made his patients drink five or six pints of the water every day, and even advised its use at the dinner-table. At the present day, says James, patients who can use the waters in such a way, are rare. Generally they excite so much reaction that they have to be discontinued.

Similar instances of the use of *indifferent cold* waters might easily be multiplied. The vast majority of sulphur or of chalybeate springs, for example, in England are so slightly impregnated with any mineral contents, that the cures effected by them must be regarded simply as cold-water drinking cures. In former days far more faith was placed in those feeble wells; now most of them have been forgotten. They, however, continue to supply the same water as formerly. The secret of their usefulness was, no doubt, contained in the early morning walk and the copious draughts of fresh water, which were forced on those who resorted to them.

There is no question about the *absorption* of a great portion of the water and of the salts, and of a portion of the gases, by the *stomach*.

Of the action of the *nitrogen* on the stomach we really know nothing, but it is supposed to be soothing: it is pretty much the same with the very minute quantities of *sulphuretted hydrogen* present—if the water be hot, it is supposed to be exciting.

Carbonic acid forms so important an element in many mineral waters, their degree of palatability depending on its presence more than on anything else, that it requires a longer notice.

Wonderfully little is known of its effects when taken into the stomach, beyond its immediate effect of pleasant stimulation, when taken in small quantities. Taken in large amounts, a portion of it is immediately got rid of by eructation, but enough may remain to cause a certain amount of lightness of the head analogous to that caused by champagne, and sometimes a feeling of distress about the heart, where the action of that organ or of the lungs is not free. This gas appears to act not only as a stimulant to the stomach, but also to the intestinal canal : in this way it is useful, particularly associated as it usually is in mineral waters with small amounts of alkalies or of earthy salts, in indigestion and torpidity of the bowels. Sometimes these waters are of no small use in quieting irritability of the stomach. Carbonated water is at all times refreshing, and the use of such waters at the table is an adjuvant to other stronger waters, especially where alkalies are indicated.

Have any of the constituents of mineral waters a distinct action on the system through the process of *absorption by the skin*? It had long been taken for granted that such substances were absorbed. After immersion in the soda baths of Vichy, the urine was found to be alkaline ; where could you have a clearer proof of the absorption of alkalies? but unfortunately for this conclusion, it was found that baths with scarcely any mineral constituents, or with salts that were not alkaline, also produced this effect.

The general result of experiments appears to show that the skin readily absorbs the gases of fluids, their mineral constituents very slowly, if at all ; but at the same time

there is no doubt, that the stronger mineral waters produce a positively stimulant effect on the skin, beyond the action of the mere water.

Clemens has arrived at the following results :—1. That a few gaseous substances, such as hydrosulphuric acid, readily penetrate the skin. 2. Other substances penetrate slowly, but they take so much time, that their doing so can really be of little importance in balneology ; such as iodine and water. 3. Others can only penetrate the epidermis, and work solely by their stimulant effect on the surface nerves, such as common salt, chloride of lime, salts of lithia, corrosive sublimate, salts of lead. 4. Some substances only penetrate the epidermis in the most minute quantities, such as sulphate of iron, iodide of potash, sulphate of soda.

More recently, in April 1870, Grandeau presented the report of the Committee of the Society of Hydrologie, whose labours have extended over five years, and include fifteen sets of researches. They regard the results of M. Roussin as most important. The mineral substances used by him in his researches were iodide of potass, yellow cyanide of potass, and bichloride of mercury. The vegetable ones were digitalis, belladonna, and decoction of asparagus.

It appears to be proved—

1. That in a bath the human skin is not, owing to its sebaceous secretion, in actual contact with the water ; therefore that it cannot absorb.
2. The sebaceous secretion is the only obstacle to absorption.
3. Any substance to be absorbed by the skin, must be

mixed or be capable of being mixed with the sebaceous secretion.

4. In this way a fine powder laid on the skin may be absorbed.

By scraping and soaping the skin, or in any way removing the sebaceous secretion, it is thus evident that you may favour absorption. But what concerns us is the positive conclusion, that under the ordinary conditions of a water bath there is no absorption by healthy skin. These are exactly the results obtained by Seguin and our own Currie in the end of the last century.

But in spite of all this, a certain number of bath practitioners cannot be persuaded that some salts are not absorbed, and it is a matter beyond question that some mineral waters stimulate the skin much more powerfully than others. This has been explained by saying that mineral waters which stimulate have a stronger stream of electricity ; but until we know more of such questions it is better to look for more palpable causes, and these will be found in the presence of large quantities of common salt, of smaller quantities of salts with carbonic acid, and in minute quantities of iron with carbonic acid.

It may save repetition, to speak here of the *carbonic acid* common to so many mineral baths, as it occurs in two natural combinations.

It has been already said, that gases are absorbed by the skin with comparative readiness, and it has been found that the amount absorbed is proportionate to the pressure exercised. In determining the action of the carbonic acid

present in baths it is difficult to distinguish that of the gas which has been absorbed through the skin, from that of the gas which is inhaled through the lungs. Braun, while the question remains unsettled, thinks it unlikely that, with the capillaries of the skin probably strongly contracted if the water be cold, any considerable amount of carbonic acid can be absorbed.

When a *salt* bath of 86°, containing much gas, is taken, the reaction and feeling of warmth come on much earlier than in a common salt bath. The skin becomes red, the action of the muscles appears freer, and there is a slight feeling of pleasant excitement in the head. The effect on the constitution is believed to be a general increase of the activity of the nutrition, and of the more important organic functions.

As none of the mineral contents are absorbed in the case of *alkaline* and *alkaline saline* waters, their effect is that of very soft water, which mollifies the epidermis, and makes it particularly easy to clean the surface of the skin. No such waters are rich enough in salts to act as stimulants, and the stimulating action of such baths depends on their temperature and on the carbonic acid they contain, unless the bath is made strong artificially, which is expensive.

Much the same is the case with *steel* baths, in which ladies have so much faith, not entertaining a doubt that the iron is absolutely absorbed through the pores of the skin. This is entirely imaginary; not so, however, the benefit which they actually derive.

Flechsigg, after a careful analysis of the comparative effects of lukewarm water, of plain water, and of water containing

iron and carbonic acid, has arrived at the following general conclusion, that iron baths act on the system mainly by producing stimulation of the peripheral nervous system, and thus altering the functions of the skin and lungs. The altered activity of the skin seems to be the prime mover of the further changes which take place in the interstitial change of tissue.

Along with increased appetite, which they have the power of giving in common with plain water baths, they seem really to support the powers of assimilation in a greater degree.

Of the action of the other gases on the cutaneous surface little can be said. Nothing is known of the action of nitrogen, which is sometimes present in very considerable quantity. To the minute quantities of hydrosulphuric acid present, an exciting influence has usually been ascribed.

With reference to the effects of the *inhalation* of the small quantities of carbonic acid, nitrogen, or hydrosulphuric acid (I leave any minute quantities of other gases out of the question), which must be taken in, in the air of the pump-room in drinking and in the bath, they are usually very insignificant. But sometimes so much carbonic acid is present in a bath, as to make it best to exclude the head. The inhalation of gases by various artificial methods is another question, and will be again alluded to.

Such is a general sketch of what is common in the action of mineral waters. But very much remains to be ascertained. Dissatisfied with our defective knowledge,

many practitioners still attribute certain mysterious healing virtues to their waters. But while the mode of operation of so many of the ordinary articles of the *materia medica* is so imperfectly known, it is scarcely necessary for them to assume the existence of hidden properties.



BOOK II.

PARTICULAR WATERS.

CHAPTER I.

INDIFFERENT WATERS.

THE first class of waters is that of *indifferent* ones, which contain very small amounts of mineral constituents. These waters are very generally drunk, as well as employed in baths. There is no satisfactory evidence of their operation when they are drunk differing from that of ordinary waters of corresponding temperature. This class of waters acts mainly like simple warm baths on the skin. Their first effect, at temperatures of about 90° to 96°, is to excite gently the peripheral nerves, to make the circulation more active, render the respiration freer, and produce a desire to make water, which effects are followed by increased frequency of the pulse, increased cutaneous transpiration, and augmentation of the urinary secretion. They regulate the action of the skin and that of the kidneys, and seem to have a power of dispersing exudations. They improve the appetite, and they make

the ingestion of more nourishment possible. A great many patients find the effects of even the least mineralized waters to be exciting.

The great majority of indifferent wells are thermal. Indeed, where there is no smell of hydrosulphuric acid, they would never have attracted attention but for their higher temperature.

As a great many of the more important indifferent thermal springs, which used to be called wild baths, *Aquæ Ferinæ*, or *Thermæ Silvestres*, rise at a very considerable altitude above the sea-level, and many of them owe at least an important share of their curative effects to a more or less Alpine climate, the following list of some of them may be interesting. It gives their temperature, the amount of their mineral constituents, and their elevation above the sea:—

INDIFFERENT SPRINGS.

	SOLID CONTENTS.	TEMP.	HEIGHT.
Landeck	1.8 . . .	63° — 90°.5 . . .	1,398
Panticosa	1.9 . . .	85 — 95 . . .	5,110
Evian	2.6 . . .	53.6 . . .	1,100
Badenweiler . . .	2.8 . . .	69 — 81.5 . . .	1,425
Römerbad	2.8 . . .	97 — 102 . . .	755
Plombières	2.8 . . .	66 — 158 . . .	1,310
Pfeffers	2.9 . . .	99.5 . . .	2,115
Bains	3 . . .	73.4—120.2 . . .	918
Chaudfontaine . .	3 . . .	91.93 . . .	700
Buxton	3.2 . . .	82 . . .	1,000
Schlangenbad . . .	3.4 . . .	80 — 87 . . .	900
Gastein	3.4 . . .	95 — 118 . . .	3,315
Dax	4.7—10.2 . . .	139 . . .	120
Wildbad	5.7 . . .	90.5—101.7 . . .	1,320
Warmbrunn	6 . . .	105 . . .	1,100
Teplitz	6.7 . . .	101 — 120 . . .	648

Indifferent baths, especially the milder ones, are often found useful in calming the *nervous system*; the continued use of lukewarm baths exercises a very beneficial effect in over-excitability of the nervous system, and in tendency to spasms in hysterical women, also in painful menstruation, and a large class of nervous cases, where there is much irritability of the spinal cord. On the whole, this class of waters, and the similar one of earthy ones, has maintained over the longest periods its reputation in sterility.

They find a further application, when hyperæsthesia manifests itself in the form of neuralgia, especially in those forms which have a gouty or rheumatic foundation, and in those which are the consequence of former injuries, and of exudations consequent on them, or of inflammation of the nervous sheaths. The prognosis is less favourable, when there has been any wasting of the part, or there is incipient paralysis of it. Some of the neuralgias that receive most benefit, are facial, brachial, intercostal ones, local affections of portions of skin, particularly the result of exposure to cold, and sometimes neuralgia of the breasts. True tic again is very seldom cured, and sciatica usually resists all thermal treatment.

Loss of power in its various degrees is treated often with much success, by the use of the warmer baths, which probably operate by reflex action on the motor nerves; but if electro-muscular contractility is found to be quite gone, little can be expected from them. It is therefore always wise to ascertain beforehand, experimentally, by electricity,

the real state of the muscular contractility ; and it may be remarked, that electricity, used in connection with baths, assists their efficacy much ; practical men seem to think that the use of electricity, before and after a course of bathing, is of more use than when both agents are used simultaneously.

The cases which gain most from thermal treatment, are those in which the exciting cause of the paralysis is removed, while the loss of power continues ; such are partial paralysis after diphtheria, and some effects of typhus ; also loss of power of the lower extremities, the consequence of bad confinements, and paralysis from lead-poisoning : in such cases, in many of which recovery would, in the natural course of things, ensue in time, recovery is often greatly accelerated by the exciting action of the hot waters. The results of shocks or blows, or of violent impressions on the nervous system, are often removed ; but where any mechanical cause exists for the paralysis, benefit cannot be expected. In all these cases, the judicious application of douches has much to say to the cure. Care must always be taken never to use water hot enough to produce blistering in paralysed limbs.

In certain cases of more serious paralysis—the results of apoplexy, or of the effusion of blood in the brain—thermal treatment may be of considerable advantage, especially if the cases are not treated too soon after the apoplectic attack ; but much caution is always required in such cases, and the state of the heart and blood-vessels must be carefully ascertained.

In cases of hemiplegia, in which the brain has undergone structural alterations, and in paralysis agitans, or progressive muscular atrophy, little is to be expected.

In paralysis of spinal origin a good deal may be hoped for, if there be any rheumatism present, especially if the case is not too old, and if the power of the sphincters has not been lost. In true tabes dorsalis no benefit is obtained, and it is miserable to see such cases dragged from one spa to another, in the vain hope of cure.

Gout is not cured by any waters, but is often alleviated by them: the earlier gouty patients resort to them, the more likely are they to derive benefit from them. But it is especially in the results of gouty deposits in the joints and synovial membranes, and the skin and surrounding cellular tissue ending in stiffness, that the steady application of these waters is most useful, and in such cases there often takes place such an amount of absorption of previous exudations, that one or two seasons at a bath may give relief for a series of years. It is the cases of gout in weak and flabby and older patients, that are most suitable for these cures.

Chronic *rheumatism* profits much by thermal treatment, whether it has all along had a chronic character, or is the result of an acute attack, especially when there is much thickening of the joints or old muscular rheumatism. Of course it is very necessary to be sure that you do not treat by the hotter baths cases complicated with heart disease. Simple effusion into the joints, pseudo-ankylosis, adhesions of the sinews to joints, exudatory bands in the cel-

lular tissue round joints, often find resolution, if the limb has not been too long kept in one position ; but no cases where absolute destruction or absorption of surfaces has taken place, can expect benefit, and scrofulous cases generally derive no advantage.

Thermal waters are useful in cases of old ulcers and wounds, and in metallic poisoning ; but these affections will be noticed under the head of sulphurous waters, which have the reputation of being still more efficacious.

In affections of the *joints* the waters must be used very warm, and the treatment is most materially assisted by local douches and frictions. The bath treatment of joints very often produces exacerbation of the feelings of discomfort in them, in the first instance.

The following are the chief indifferent baths ; their mineral constituents are so trifling in amount, that they do not deserve separate mention.

Gastein is in many respects the chief of indifferent thermal baths, whether we consider its altitude, the magnificent scenery in which it lies, or its ancient repute—for it is one of the older baths. The districts of the Salzkammergut and parts of Styria have of late attained that popularity with the English which they deserve, and Gastein is now more visited by them. It is, however, still twelve or thirteen hours' drive from Salzburg, the nearest railway point, and will always, owing to its remote position, probably continue to be one of the most select watering-places. It is always necessary to write beforehand for lodgings.

It combines the advantages of an Alpine climate, of suffi-

cient elevation, and of excellent bath arrangements. The chief drawback in it, as in most mountain stations, is the heavy fall of rain; in June and July the rainfall is twenty-one to twenty-two inches. The mean temperature of June, July, and August varies from 54° to 59° . The season is unfortunately short, owing to the coldness of the climate; and the best time is from the middle or end of July, up to the first or second week of September. The temperature at which the baths are used, varies from 86° to 104° ; some patients can only bear them for ten minutes, others remain in them for an hour. As the lodging accommodation is scanty at Gastein, many visitors are accommodated at *Hof Gastein*, 500 or 600 feet lower, whither the water is conducted from Gastein, and is of the temperature of 95° . There are no shady walks here as at Gastein; the most interesting excursions can be made from both. Besides producing the usual effects of other indifferent thermal waters, Gastein is found to be particularly useful for persons of advanced years, for some forms of hysteria and of hypochondriasis, for calming the nervous system and allaying cerebral irritability, perhaps also in the effects of sunstroke. It has a special repute in cases of *tabes dorsalis* and of impotence. But the basis of the reputation of any waters in such cases is always very doubtful.

Römerbad or *Tuffer*, in Lower Styria, deserves to be mentioned, owing to its having a fine climate, and being a place of resort easily reached from Vienna or Trieste. The temperature of the baths varies from 94° to 98° . It lies 750 feet above the sea, and it fulfils the indications

of the milder thermal baths ; according to analogy, its effects ought to resemble those of Schlangenbad. The place is prettily situated, much visited by the Trieste people, and might be convenient for English families settled in Gratz.

Pfeffers and *Ragatz*.—Similar in their effects to Gastein, are the baths of Pfeffers, 2,130 feet above the sea, off the valley of the Rhine. They are elevated enough to give something of an Alpine climate, but they are situated in such a gloomy and extraordinary ravine, eroded by water, in limestone rock, that although the old baths are occupied by the poorer class of patients, no invalids would from choice reside there, especially as the waters are conveyed to Ragatz, about 500 feet lower, where the comforts of hotels and new baths are to be had in an open smiling valley, with fine Alpine scenery around. One of the largest hotels and bath establishments in Europe, with an immense swimming bath, has been recently erected here. The climate is on the whole a mild one ; the extremes are less than might have been expected. The place is very accessible, being on the railway to Chur, and on the way to St. Moritz ; it is also one of the nearest points to Davos, which has of late been brought forward as a climatic resort for chest complaints. Ragatz is suited for much the same class of cases as Wildbad or Gastein, and is not expensive. They drink the water at Pfeffers, and also bathe in water of an average temperature of 99° ; at Ragatz it may be counted 95°.

In former days Pfeffers had a great reputation ; and Paracelsus wrote full accounts of its virtues in a great variety of

diseases.¹ It has now no longer any répute in the treatment of skin diseases, nor indeed is any special class of complaints the subject of particular treatment. On the whole, it seems best adapted for restoring tone to the general nervous system, and it is particularly well adapted for some neuralgic affections of women and some irregularities of their system.

There are vapour baths and douches, and no doubt many cases of gout and rheumatism might be treated here, though the treatment is not usually energetic enough for thickened joints. I wonder the English are not more numerous.

Wildbad, in the Black Forest, at a height of 1,333 feet, with a pleasant climate in the summer months, can now be reached the whole way by railroad, and in twenty-four to thirty hours from London by Paris and Strasburg. The temperature of the baths varies from 89° to 97°. Wildbad has new baths, which are being extended, and has excellent hotels and *pensions*: the living is moderate. The scenery of the Black Forest is sub-Alpine and very pleasing; in short, there is everything here to make a bath liked by those who do not require the presence of any strong excitement.

It is perhaps more destitute than any other place of the kind, of an apology for a drinking well; such as it has, is most vapid. There are baths here for the poor as well as the rich—single baths, and others to be used by more than one. The bottom of the baths is covered with a very fine sand. Although the baths are shallow, the supply of water is suffi-

¹ Contraction of limbs, paralysis, gout and rheumatism, old fevers, calculus and gravel, skin diseases, and some complaints of women.

cient, and it is in a state of constant renewal ; and on the whole there is no place that should suit patients better, in search of such effects as can be looked for from thermal waters. All the arrangements about the baths are excellent. Though adapted for the milder treatment of gout, Wildbad is chiefly resorted to for various forms of paralysis and of partial ankylosis. I observed more lame and paralysed patients here than anywhere, except at Teplitz. A peculiar breed of dogs of the country, which appears to be "gone" in the forelegs, cuts an amusing figure among the lame human beings.

Wildbad has recommended itself specially to the English : and of late years the resort to it has been inconveniently great ; its only superiority over baths of the same class, is in the management of the establishment.

Badenweiler, in the Upper Breisgau, an hour from the railway station of Mülheim, 1,450 feet above the sea, lies in a beautiful part of the Black Forest, and enjoys a very mild climate. It has for some time been a favourite German place of resort for diseases of the chest. The baths have only a natural temperature of 81°; so they are heated artificially. There are several well-arranged sets of baths in the different hotels, and a large swimming bath is being erected, not very far from the very complete remains of the Roman thermæ. It is only comparatively of late that this place has been resorted to for its thermal springs, which are most abundant, and are used almost exclusively for baths. It is also a favourite station for the whey cure ; and it possesses many advantages of climate, scenery, and

cheapness. The place is growing rapidly, but the English have not yet found their way there in any great numbers.

Warmbrunn, in the Riesengebirge of Silesia, at a height of 1,100 feet, with waters of a temperature of 95° to 105°, is an old-established place, with admirable bath arrangements. It is visited in great numbers by northern Germans ; but its climate is somewhat severe, and as it lies quite out of the track of the English, it need not be further mentioned.

Landeck in Glatz, still some four hours' drive from the nearest railway station, may be termed the Silesian Buxton : it lies at a height of 1,400 feet, in a romantic country, and has a rather cool and bracing climate. The waters were formerly called sulphurous, owing to their having a slight smell of sulphuretted hydrogen. The water is nearly pure, of a temperature from 59° to 73°—so has to be warmed for baths. The baths are used for rheumatism. The whole character of the place is tonic and invigorating ; the bathing arrangements are good, living is cheap, and the visitors are said to be sociable.

Schlangenbad, 900 feet above the sea, and not far either from Schwalbach or Wiesbaden, is a place for those to fly to, who cannot bear the overcrowding that is met with at both of those stations during the season. But at times it gets itself overcrowded. It is as picturesque as a place can be on the small scale, with shady alleys and endless forest paths. The baths, which are used at a temperature of 88° to 93°, are beautifully arranged, and I can vouch for their pleasant feeling, though I leave it to the fair sex to vouch for their cosmetic qualities. They have a great reputation for quieting and strengthening the nervous system, and are

resorted to very much by hysterical patients, and ladies suffering from functional derangement of the uterine system. Skin complaints are also treated here. Most English consider it dull.

In a very different country from that about Wildbad, lies *Teplitz*, the type of waters of this kind ; it and its adjoining rival *Schonau* possess probably more bathing establishments than any other bath in Europe. The waters are abundant and the temperature high, and they are used of the highest temperature that can be borne. The baths have contributed mainly to establish the reputation of indifferent waters. They have a special name, like those of Barèges, for being useful in the effects of gunshot wounds. Of late years, as in all the Bohemian baths, so here, peat baths have been an essential part of the treatment, and electricity is largely used. The operation of these waters has been minutely studied by an excellent staff of medical officers. They consider that in the case of thickened joints and old sprains, the waters have a wonderful power of causing resolution and absorption, and have a direct influence on the nerves of sensation, which makes them useful in many neuralgias. The waters are also useful in atonic gout.

The old town of *Teplitz* is somewhat dull and old-fashioned, as are its hotels, and the tide of visitors has of late years flowed to the newer suburb of *Schonau*. The country around *Teplitz* is full of objects of interest ; among them one of the most alkaline of the German springs, *Bilin*, rises almost under the shadow of a very striking igneous rock ; and in the immediate neighbourhood, in the forest of the Fichtel-

gebirge, is *Eichwald*, a place of resort in lung affections. That singularly picturesque district, the Saxon Switzerland, is easily visited from Teplitz. Teplitz is reached by a branch railway, from the line running between Dresden and Prague. The English do not appear to have visited it so much of late years : but the bath has often been visited by kings and emperors, and is one of the most crowded on the Continent. Everything that has been said about the effects of the indifferent thermal waters in disease, may be considered specially to apply to Teplitz, where the practical arrangements are excellent. The new Kaiserbad is a great addition.

Plombières, in the Vosges mountains, at an elevation of 1,300 feet, reached easily from Paris and Nancy, is not known as much as it might be to the English. Its waters should be just as efficacious as those of Wildbad or Teplitz, and the establishments are admirable. I do not think I have seen any greater or more commodious baths than those of the Bains Napoléon. The water is so abundant, and its temperature so high, that it can easily be employed at any temperature wanted. There are several sets of baths in the town.

The little town follows the bendings of a very narrow valley. All the old baths and old houses look much as they must have done in the days of Montaigne, although the curious practice, of grand seigneurs presenting to inns their coats-of-arms cut in wood, has disappeared. There is much that is lively and pleasant about a French town, and those who go from year to year to German spas might try

Plombières as a variety. There appears to be plenty of small gaiety, and amusement for young people, and the neighbourhood is very picturesque. There is an establishment for soldiers. In drinking the waters, patients begin with one or two glasses, and increase them to five or six : in former times they used to take from fifteen to twenty. The water is easily borne by the stomach, and never produces crises or disagreeable effects. There is a chalybeate here which is much used, chiefly as a table drink. I had occasion to prove the efficacy of the baths and douches in obstinate lumbago. Besides rheumatism and chronic joint affections, the French resort here for stomach complaints, and neuralgia and various diseases of women. It is specially contra-indicated in phthisis. Verjon has given us some valuable reports from the military hospital (and such reports are worth much more than imperfect histories of visitors). He records successful treatment of dyspepsia and gastralgia by the combined use of baths and drinking. He also found chronic diarrhœa, occurring mainly in soldiers who had been on foreign service or in the tropics, amenable to local treatment by baths. He found the internal use of the waters scarcely allowable in those cases.

Bains is a quiet little bath, a few miles from Plombières. Its waters are practically the same, and it has two bath establishments. Although its waters fulfil the same indications as those of Plombières, it is quite eclipsed by its neighbour.

Evian, with waters of very feeble mineralization, lies on the south side of the Lake of Geneva, nearly opposite Lausanne. The waters are limpid and perfectly tasteless. These

waters are considered sedative and are used in neuralgia and indigestion.

A short way off are the similar baths of *Amphion*, which contain a minute quantity of iron. It is said of the waters of Amphion that they are inferior in no respect to those of Evian. But that is not saying a great deal. We are told that they cure all diseases, only they are severely (!) contra-indicated in plethoric subjects, and those who are subject to hæmoptysis. It is a very good situation for a hydropathic establishment, which, I believe, is by this time completed.

Owing to the great abundance of its sources and their high temperature, the waters of *Dax* have been known since the time of the Romans. The town is old-fashioned, and contains many records of Roman times. It is in the Landes, and on the line of railway from Bordeaux to Bayonne. Three years ago the bathing arrangements were of a very primitive nature ; but there was a considerable resort to the place by the natives of the country. Since then a company has been established, and a new set of baths has been built. The deposit from the baths is used here as well as the hot waters. The springs are very powerful thermal ones, well adapted for the treatment of rheumatism, one of the affections that profit by treatment at such places. The country is flat, and not attractive.

Chaudesfontaine, if its waters be not very remarkable, is so prettily situated, and lies so conveniently on the route from Liège to Spa or Aix-la-Chapelle, that it should not be overlooked. It is in great favour with the people of Liège. Its

waters are warmer, and probably their effects are at least as powerful as those of Buxton or Schlangenbad.

Caldas de Oviedo, in the province of that name in the north of Spain, is a village in a cheerful country. The waters of this place are of the temperature of $108^{\circ}.5$, feebly mineralized, but believed to contain a good deal of nitrogen gas. The waters are used in baths and douches, and also drunk. They are said to be diaphoretic and diuretic, and to excite the digestive functions moderately; but the chief virtue of the waters is considered to reside in their nitrogen gas, which, employed in an inhalation-chamber, is used successfully in affections of the respiratory organs. Some years ago the number of visitors used to be 700 or 800 in the season, but I have not been able to see any late accounts of the place, or to learn that English have ever gone to it. There appears to be a fair bathing establishment. The place has good air, and water, and provisions. Seasons from June to the end of September.

Panticosa, which has an immense reputation in Spain in consumption, is situated high up among the Pyrenees, and is almost the highest bath in Europe. After leaving the village of Panticosa, you pass for one and a half or two hours through a narrow gorge in some savage and broken mountains, called the Staircase. At last the road turns sharply, and you discover a group of houses forming the thermal establishment. Their base is washed by a small, deep blue lake, into which some magnificent cascades fall. The establishment is one of the best in Spain. The place is small and shut in; there is only one short walk

in the vicinity, and just room to turn a boat in the lake. The climate is represented as comparatively mild.

The principal sources are four in number : that *de la Laguna*, or of the tank, used for drinking only ; *del Estomago*, of the stomach, which contains a little sulphur ; *de los Herpes*, of eruptions ; and *del Hgado*, of the liver. The water most used for baths is the *de los Herpes*. The waters are employed for drinking, for bathing, and for the inhalation of nitrogen. The patient usually drinks from twenty-five to thirty glasses a day ; the water is counted sedative, and produces no febrile reaction like that of Eaux-Bonnes. The chief diseases treated are chronic affections of the chest, loss of voice, phthisis, and stomach affections. Details have been sent me of various cases of hæmoptysis that have improved here. The season is from July to the end of September ; the place is of course deserted in winter. It is visited by French and English, chiefly as a curiosity, owing to its elevated position, but is in growing repute with Spaniards. The arrangements are said to be very fair, but rather of a primitive description ; nevertheless it has about 1,000 visitors annually, chiefly Spaniards, and of the higher ranks, who stalk about rather dismally, wrapped up in their cloaks. One of the great drawbacks of Panticosa is the tiring journey to it for invalids. It is more accessible from the French than from the Spanish side. But even then it is a journey of many hours in diligence from Pau.

Buxton, in Derbyshire, at nearly the same elevation as Schlangenbad, while its wells are very similar, enjoys a

more bracing climate, a great advantage at the season when baths are visited, though not so in winter. The arrangements at Buxton are fair, and it has long deservedly enjoyed a great reputation in chronic rheumatism and gout, rheumatism being the chief disease treated in the Devonshire Hospital. In the treatment of sprains and stiff joints generally, the douching and mulling is inferior to what it is in establishments abroad. Why should this be so? The natural heat of the waters, which are very abundant, and contain a very large quantity of nitrogen, is 81° to 82° , and it is raised when necessary: but the waters are found to be most efficacious when used at their natural temperature. Ten minutes is about the average duration of a bath. The waters are also drunk, but I conceive this is an unimportant part of the treatment. They are considered to be in the first place stimulant; in the second, alterative. To those who prefer staying at home, Buxton, with its interesting neighbourhood, presents many attractions; it produces all the good effects of the less stimulating indifferent waters, and its chief recommendation, as compared with continental baths, is, that going to it saves a long journey; but living at it costs more than almost anywhere abroad.

Matlock, with water of 68° , and lovely scenery, is analogous to Buxton, and may be noticed here notwithstanding the slight calcareous impregnation of its waters; but it is resorted to now for its natural scenery and hydropathic establishments, rather than for its baths.

CHAPTER II.

EARTHY WATERS.

WE come next to the waters containing earthy salts. The majority are thermal, and many of them rise at as great elevations as the indifferent springs, from which indeed they only differ in the larger amount of their mineral constituents. All that has been said of indifferent waters applies to earthy ones as baths ; but some further examination is required of their mineral contents, especially with reference to such operation as they have as drinking waters.

The *earthy salts* are sulphate and carbonate of lime, carbonate of magnesia, and sulphate of alumina. Of these, the two first play far the most important part in mineral waters. An immense quantity of lime is required by the system, and is supplied to it in food chiefly in the form of phosphates. Lime taken into the stomach, and that is made use of, deposits itself in the system mainly in that form, in which also it is chiefly excreted through the alimentary canal. Of the physiological effects of carbonate or of sulphate of lime, little is known directly. They act to a certain degree in neutralizing the acids of the intestinal canal ; small quantities

of the carbonate are very usefully employed in our ordinary prescriptions for irritation of it; but in large quantities, especially in the form of the sulphate, they retard digestion, and in very large quantities may be injurious, although the old notion that gypsum (the sulphate) was a poison, is untenable. We may probably expect from their use some diminution of excessive secretions and of overaction of the kidneys. A still larger quantity of magnesia than of lime reaches the stomach in the food, but of its use in the economy our knowledge is imperfect. The greater part of the magnesia leaves the system unaltered, not being required by it. The carbonate, besides neutralizing the acid of the stomach, acts slightly as an aperient.

With the effects of alumina we are but partially acquainted. It acts chemically on surfaces to which it is applied, and which are not protected by mucus, and it undoubtedly is astringent, and is inclined to produce constipation.

Of earthy waters by far the largest constituent is lime. The amount of carbonate of magnesia present in them is small, and alumina is generally presented in some shape, which makes it very disagreeable to swallow it.

Earthy salt waters are much more used as baths than for drinking. But springs with lime in them have often been in repute in the treatment of diseases, such as *softening of the bones*, in which it was supposed that the system suffered from a defective supply of lime; but abundance of lime is always offered in food; the defective action is with the system. You cannot make it take up lime by simply presenting to it that substance, even in the state of phosphate,

however theoretically correct such practice may appear to be. The root of the disease lies either in the stomach not being able to take up lime, or in the organs excreting too much of that substance, and it is to correct such state of the system that we must address ourselves. Phosphate of lime, I believe, like many other medicines, owes its reputation mainly to the fact of its being innocuous.

For somewhat similar reasons the lime waters have gained some credit in *scrofula* and in *tuberculosis*; probably on equally insufficient grounds.

They have often been used in *dyspepsia*, a complaint in which, when used with moderation, they may be of benefit as antacids; and, indeed, it is only in this last way that we can imagine their being of use in the constitutional affections just enumerated.

The rationale of some of these weak lime waters being esteemed as efficacious as the distinctly alkaline waters in *bladder* affections is not quite clear; but some of these waters have a reputation in gravel and affections of the bladder, which is founded on experience of their real utility, which cannot be easily gainsaid.

The following list of some of the earthy wells, shows the amount of their mineralization, their temperature, and the elevation at which they rise :—

EARTHY WELLS.

	CONSTITUENTS.	TEMP.	HEIGHT.
Bornio, M. . . .	10.3 . . .	86°—104° . . .	4,400
Luxeuil	11.6 . . .	92 — 153 . . .	1,230
St. Amand	15.3 . . .	66 — 95 . . .	..
Leuk, L. . . .	18.6 . . .	3 — 123 . . .	4,400

	CONSTITUENTS.	TEMP.	HEIGHT.
Bath, K.	20.2	108°—122° . . . .	..
Lippspringe, A. . . .	24	70	350
Lucca	26.3	108 — 122 . . . .	..
Courmayeur	26.4	62 — 95	3,800
Bagnères de Bigorres	28.4	64 — 123	1,800
Contrexeville. . . .	29.4 . . . .	.. . . .	1,050
Vittel	32.8 . . . .	.. . . .	1,020
Chianciano	34.8	100	1,800
S. Giuliano	34.5	82 — 105 . . . .	..
Weissenburg	34.2	75 — 80	2,600
Baden (Swiss) . . .	43.4	119 — 124	1,020
Viterbo, B.	27—48	113 — 140	1,500
Cransac	41—68 . . . .	.. . . .	900

The baths of *Lucca*, with a wonderfully temperate climate during the fine season, situated in a beautiful valley, some fifteen miles from Lucca, have been long places of great resort. Montaigne has given us a very full account of his experience of its waters.

The hottest spring is 116°. The waters are used much more for baths than for drinking. Their effects are the same as those of Bath or Leuk, and all the benefits to be procured from indifferent waters in the plains may be obtained here. Some of the springs are used as diuretics, and in herpetic affections, but they are chiefly used as baths in rheumatism and neuralgia, and also in uterine disorders. There is a natural *stufa*, the air of which causes profuse perspiration, and the *fango* or sediment is used as a local application. These baths have not of late years been favourites with the English, as they always migrate to the north before the season, when the baths of Lucca become available. June to September is counted the bath season; the baths are on a very extensive scale, and there is ample pro-

vision for the poor. Lucca is healthy, and the neighbourhood is picturesque. All Florence goes to it in the season, but they go for coolness and for society rather than to use the baths. Every convenience of life is to be had here as well as in Florence. It is therefore the most comfortable of all the Italian baths, and it is a cheap place.

San Giuliano, four miles across the plain from Pisa, and situated just at the base of the mountains, enjoyed a great repute for many centuries until eclipsed by the superior attractions of the similar and neighbouring springs of Corsena or Lucca. There are still excellent bath arrangements here for rich and for poor ; and free use has been made in the baths of the marble so abundant in Italy. The temperature of the baths is from 86° to 128° , and the presence of calcareous salts is attested by the incrustation of brooms allowed to stand in the water. The temperature of the baths can be varied a good deal. They are used in chronic rheumatism, partial ankylosis, and neuralgia ; also a good deal in uterine affections, like the waters of Lucca.

Chianciano, four miles from the nearest railway, and in the district of Sienna, lies in the valley of Chiana, at a height of over 1,800 feet, not far from Monte Pulciano, famed for its wine ; it has springs of the temperature of 100° , strongly impregnated with lime, also strong iron ones, and a purgative.

These wells have a great local name ; they are now chiefly used for bathing, although as much as twelve pounds of one of the springs used to be drunk daily by

the patients. Like other lime waters, they have reputation in irritation of the bladder and in gravel, also in indigestion ; used in the form of baths and of douches (and the Italians have always been particularly fond of douching), they have been found useful in enlargements of the liver and spleen, and as injections in vaginal catarrhs. They are chiefly resorted to by Italians, who visit them to the number of about 500 annually, the accommodation seeming to be rather poor ; but the charges are not high, and there are many interesting Etruscan remains near.

Baths of *Bormio*.—While the flow of English travellers sets in towards St. Moritz and Eastern Switzerland, and while consumptive patients are sent to Alpine climates, the baths of Bormio, “*Il paradiso delle Donne*,”—so called because they there become “*subito feconde*,”—with the milder climate of the southern side of the Alps, should not be overlooked, as they are not far distant. They are situated on the Italian side of the Stelvio route, the highest over the Alps, at a height of 4,400 feet, and in the midst of the most grand scenery. The old bath is some 500 feet higher than the new one. The new bath was started by a Swiss company, and every comfort is to be got there during the season, which lasts from 15th June to 15th September. The English who have visited these baths during the last two years have been greatly delighted with them. The baths have been used for many centuries by Italians, and by the country people, and have a reputation among them in paralysis, rheumatism, hysteria, and sterility, also in spleen and other results of malaria poisoning. I have not heard

whether under the new management the baths have kept up the character for promoting fecundity, for which the gossiping Abbé de Burgo vouched some centuries ago. It is easy to see in what cases baths varying in temperature from 86° to 104° at such an elevation, are applicable. The mildness of the climate may be inferred from the fact, that May used to be the favourite month for cures. Being well sheltered from the north and east, Bormio has been thought of for such cases of tuberculosis as are likely to profit by an Alpine climate. There is a want of shade. There is a whey cure.

Some of the English who pass to or from Italy by Aosta, may be tempted to stay and enjoy the magnificent scenery, and the mountain air of Courmayeur and *Pré St. Didier*, which is close to it. The waters of this place have a temperature of 96° . They contain not very much saline matter and in it carbonate of lime predominates. These waters have a considerable reputation, chiefly local, in rheumatism and contraction of joints, in cutaneous and in nervous affections. They are used mainly in baths. I wonder that English do not linger more on their way north at these Italian Alpine baths. There is plenty of excellent Italian society at the neighbouring Courmayeur.

Courmayeur is little visited by the English, but much resorted to by Italians during the season. It has a great deal in its elevated situation and in the beauty of its scenery to attract visitors. Its waters contain carbonate of lime and of magnesia, with small quantities of sulphate of soda and of magnesia. They are slightly purgative. They

enjoy a reputation in bronchial affections, in struma, in some affections of the bladder and of the skin.

The baths of *Leuk* are accessible enough, not being many hours' drive from the station of Sion. They lie in a valley at the foot of the pass over the Gemmi, at a height of 4,386 feet above the sea. The climate, an Alpine one, is rather subject to extremes. The waters are nearly indifferent, but contain some sulphate of lime; they vary in temperature from 93° to 123°. They are greatly frequented, but chiefly by Swiss and French. Few English go there, except to see the place as a sight.

It differs from other baths in the old habit of long-continued immersion being kept up. The baths are common, and persons of both sexes, in long bathing gowns, frequent the same bath, and spend hours together, eating, reading, and playing chess on floating boards. Patients are warned to be careful about the bath which they select in the first instance, as it is difficult afterwards to make any change, without giving offence to your neighbours. I fear that the visitors are apt to be disputatious, as the police regulations order that there are to be no discussions on religious subjects.

The same cures are produced by the Leuk as by similar indifferent waters, but the speciality of the place is the effect on the system of long-continued immersion in water of the temperature of 97°. It is possibly on this account, and according to Hebra's views, that these waters have always had a great repute in skin complaints. They are found very efficacious in eczema, impetigo, lichen agrius, and ecthyma,

while they are of less use, like all other remedies, in those obstinate complaints psoriasis and lepra. I have known a patient with a weak heart injure himself seriously by prolonged immersion in these baths. The water is also drunk, but there is difference of opinion among the local physicians, as to its efficacy and use in dyspepsia. The bath season extends from June to September. The months of July and August are counted the best.

Weissenburg, in a ravine off the Simmenthal, not very far from Thun, has a well which contains about 24 grs. of lime, and which has a great reputation in cases of chronic bronchial catarrh, and some eminent Swiss physicians have much confidence in its efficacy in such cases. The temperature of the spring is from 75° to 80°. Meyer-Ahrens tells that new arrangements have made a perfect little paradise of this place, but it is gloomy and cut off from the world, and is therefore only suited for those of very quiet tastes, and there is nothing in the composition of the waters to inspire us with confidence in them. The waters are chiefly drunk. There is little bathing. The height is 2,759 feet.

St. Amand, lying on the Scarpe in the north of France, enjoys a reputation for its mud baths. There is an excellent thermal establishment, one of the best in France. The waters, temperature 67°—77°, are weak lime ones, and give out a slight sulphuretted hydrogen odour. These waters permeate the layers of a peculiar elastic soil, and this, in the shape of mud, is used for baths, for which purpose it is collected in one large glass rotunda. Each patient has a separate division of this fluid mud, and its use is specially

reserved for him during the season, as it is not renewed. As the natural temperature of the mud is not high enough for most people, it is usually artificially heated. Patients remain for some hours in these baths, doing their best to amuse themselves, until they can quit them, and purify themselves in a bath of fresh water. These baths have a great name in rheumatism, thickening of the joints, paralysis, and congestion of the liver ; in fact in much the same cases as the mud baths of Acqui and Abano and the peat baths of Germany.

Contrexeville, in the Vosges, an hour and a half's drive from the nearest railway station, situated in a narrow valley about 1,000 feet above the sea, used to be rather a dull place of resort, but has considerably improved of late years. It owes its reputation to its cold lime waters, which contain about twenty grains of salts of lime and magnesia, and minute quantities of carbonate of soda and other salts.

These waters are used chiefly in affections of the bladder, in gravel, and in gout, and enjoy a great reputation as solvents of calculi. It is not very easy to explain their action, as some patients are purged by seven or eight glasses of them, while others can bear even twenty or thirty of them without being affected. We are gravely assured that there never has been a relapse among the many patients who have been cured of gravel at this place. Granting the complete cure, perhaps this need not be disputed.

Since 1864 a company has managed the place and improved it greatly. These waters are largely exported.

The waters of *Vittel*, at the distance of half an hour from

Contrexeville, are essentially the same. The sources are three, and differ from each other somewhat. On the whole they contain a little more of the sulphates of magnesia and of soda, and also a little more iron than the waters of the former place.

Pougues.—Much has been done of late years to revive the fame of this once popular bath, and to make it agreeable to visitors. It lies in the valley of the Loire, in a pleasant country not far from Nevers. It contains about thirty-one parts of ingredients, with something like thirteen of carbonate of lime, nine of magnesia, and six of soda, and some carbonic acid. But as the quantity of the last is not great, these waters, when bottled for exportation, have a supply of that gas added to them. They are popular in dyspepsia, gravel, and catarrh of the bladder.

Cransac deserves special notice among earthy waters, as being the only well in use which contains considerable quantities of *alumina*, and also very distinct traces of *manganese*; it is situated in a pretty valley in Auvergne, near an old volcanic hill, from which sulphurous fumes still exhale, and in which dark caverns have been excavated, in which patients can inhale hot air charged with the fumes.

There is uncertainty about the analysis of these waters, which vary in strength; but they undoubtedly contain large quantities of sulphates of lime, magnesia, and still more of alumina. The well in which the alumina predominates (at least 23.2 grs. of sulphate of alumina) seems to cause constipation, while the one containing a considerable

amount of sulphate of magnesia purges, when used in the quantity of five or six glasses. These waters have a special reputation in enlargements of the liver and of the spleen, and in obstinate intermittents, for which the small quantity of manganese present has got the credit, and of late years they have been largely resorted to by the French, as being eminently tonic. There is very poor accommodation for visitors, who usually lodge in the neighbouring town of Aubin.

Bagnères de Bigorres, in the valley of the Adour, was known to the Romans, and is one of the most popular baths in France. It lies in a beautiful country just outside the Pyrenees, and is easily reached by railway. There is good accommodation for visitors. The public baths are on a large scale, and admirably arranged. There are also numerous excellent baths belonging to private proprietors.

There is an immense supply of thermal waters of various temperatures. Their main character is derived from the sulphate of lime which they contain. The Foulon is perhaps the least mineralized, La Reine the most so of them. But besides lime they contain minute quantities of iron and of arsenic. The quantity of the former does not seem well ascertained. A recent analysis assigns only .08 to the Dauphin, while an old one gives the Cazaux as much as .9. Practically they seem to look for their rise entirely to the four simple chalybeates on the hill, which appear to contain about .21 of carbonate of iron. Much importance is attached to the presence of some arsenic in the waters; of this I will afterwards say something. The resources

of the place are reinforced by the sulphur waters of La Bassère which have been brought into the station. It is a cold water, containing a good deal of sulphur.

With these admirable thermal waters thus reinforced by iron, arsenic, and sulphur, there are few diseases which they do not profess to cure, especially those having what they call a dartrous or herpetic foundation.

I believe the cases that profit most here, are those of dyspepsia and hypochondriasis, chlorosis and anæmic neuralgias. The waters of the Foulon seem to have much the same effect as those of Schlangenbad, and, like all thermal waters, they are useful in uterine irritability. Of its special claims to be useful in affections of the chest and of the skin, I know nothing.

Bagnères de Bigorres is a particularly clean, cheerful little town; its winter climate comparatively mild, and a good many English used to winter there before the war.

Sacedon, on the upper part of the Tagus, not very far from Madrid, has of late years become a very popular bath. It seems to be a pleasant place of residence in a pretty country, with walks in the royal gardens, with Roman remains, and a fine gorge in the mountains, to make excursions to. These waters, which are weak sulphate of lime, were known to the Romans and to the Arabs. They are chiefly used for bathing purposes; their temperature is 85°, so that for some cases they have to be artificially heated. They are used in rheumatism and in cutaneous affections.

Alzola, in the province of Guipuzcoa, in a picturesque gorge, easily got at, by rail to San Sebastian, and thence in a

few hours by carriage, is called the Spanish Vichy, and has of late years rapidly sprung into repute. Its waters, of a temperature of about 87° , appear to be only weakly impregnated with a little carbonate of lime and some common salt; but there is no recent or complete analysis of them.

These wells, like some other weak waters, enjoy a very great name in affections of the kidneys and bladder, especially spasmodic ones of the latter and of the urethra; also in affections of the spine, where there is loss of nervous power. The peasants come in and drink these waters in winter for their coughs. The waters are drunk, two or three glasses before breakfast, and they are also used in baths. Seventeen days is the time in which they are expected to produce cure.

I know of more than one English family that derived great benefit from this place. One family visited it for five years successively; but the patients are almost all Spanish. The hotels have greatly increased in number of late years; there are good *tables d'hôte*, at which sixty or seventy people sit down; the food is abundant, and the wine excellent; still there are many things that a fastidious Englishman has to put up with. The environs are beautiful, with great variety of landscape. The season is from the 1st of June to the end of November.

Fitero, Old and New, on the borders of Castile, Navarre, and Arragon, with waters of a temperature of $117^{\circ}.5$, containing chiefly lime, and of which a fresh analysis is much wanted, is in much repute in the north of Spain. A correspondent writes: "They go there chiefly for rheumatism and paralysis. My wife and I could not regain our strength after an attack

of cholera—we both were yellow and looked like ghosts ; we were sent there in November, and found the place covered with snow ; we had to get food as best we could, but all the same we got well. I have been three times to Fitero. At half an hour's walk are the sulphur and cold waters of *Cerdela*, used to strengthen the stomach, and for skin complaints. There is excellent accommodation, and it is altogether a fine place. In Fitero and Cerdela even the dust along the roads is balsamic !” Though these waters are drunk also, their use in baths is probably most efficacious. The season is from the 1st of June to the end of September.

Bath possesses the only springs of any considerable temperature in Great Britain ; the hottest is 120°. According to early records, the ladies and gentlemen used to enter a common bath in a state of nature. After a time they were induced to adopt decent clothing, but they still resorted to common baths, and spent many hours in them, flirting and talking, just as they do now at Leuk.

But Bath, once as crowded with visitors as the most fashionable continental spa, is now no longer run after as it was. Its waters are less employed, not that they are not as efficacious as ever, and quite as powerful as any other waters of their class, for, notwithstanding the presence of a little gypsum and some other solids, and even .15 of carbonate of iron, they must be considered indifferent waters. There have always been excellent bath establishments here, but they have been recently added to by the handsome baths and swimming rooms built in connection with the new hotel.

The old Bath Hospital has been enlarged, and continues to be most efficacious in rheumatism and in thickening of the joints.

At one period the water was only used for bathing ; then drinking became an important part of the treatment. At present the water is not much drunk. Gout was the disease for which Bath used most to be resorted to, but it is a good deal supplanted by Buxton. The Bath waters have always been useful in paralysis, rheumatism, thickened joints, in neuralgias, and affections of the uterine system, also in some dyspepsias ; they were noted for "restoring the appetite of debauchees." The latest accounts represent the waters as more useful in the dry or scaly, than in the moist forms of eruptions.

Bath is one of the few places where a cure can be conveniently carried on during the winter, and it possesses one of the best English winter climates. Altogether, the fact that Bath, presenting so many advantages of climate, and of cheap living, and of pleasant if not "fast" society, should have been so neglected, in spite of its thermal springs, is very remarkable. It must be attributed partly to fashion, and partly to the city having grown too large ; few baths continue very popular, after a large city has sprung up around them.[†]

[†] The sketches of Bath life given by our old novelists, and by our professional writers, are very amusing. One of the latter, stigmatizing the practice of forcing pills and quack medicines on those frequenting the baths, mentions in the following ludicrously serious terms one of the girls employed in hawking these medicines :—"Molly Lawrence, whose most agreeable graceful exterior person gives indications of what her conduct proves, a sensible and well-disposed mind."

CHAPTER III.

SULPHUR WATERS.

A GOOD many of the wells next to be examined, under the head of sulphur ones, produce all the effects that have been described of indifferent or earthy thermal waters, and might very naturally have been treated of under those heads. For instance, Eaux-Bonnes and several of the Pyrenean waters are little more than indifferent ones ; and earthy sulphur springs, such as Baden in Aargau, Aix-les-Bains, and Abano, contain such mere traces of sulphur, that it might have been more correct to have treated of them as earthy waters. But I have on the whole found it most convenient to conform to the old usage, and I have classed as sulphur waters, all that have any hepatic or sulphurous smell, or that deposit sulphur from their stream.

Sulphur waters are very weak solutions of sulphur in combination with alkalies, or of hydrosulphuric acid,—such weak solutions, that it is difficult to believe that the efficacy of what are called sulphur waters depends merely on the minute portion of sulphur present. Practical men say that

the efficacy of such waters bears no relation to the quantity of sulphur which they contain. It is common to regard sulphur waters as belonging to two classes, those containing combinations of sulphur and soda, and those having sulphur and lime. The first the French call real sulphur waters, the second accidental ones. A very important division is into hot and cold. The greater number of the first are warm, of the second cold. Many, especially of the colder ones, contain considerable quantities of earthy salts, of common salt, and of sulphate of soda, and many of the warm ones produce the *barégine* already spoken of. Sulphur waters vary a good deal in strength, according to barometric pressure, and are also often affected by falls of rain.

It is so difficult to form any notion of the quantity of sulphur really present, from the sulphuretted hydrogen as mentioned in inches—the strongest accurately analysed waters not containing more than from half an inch to two inches in the pint—or from the minute quantities of sulphuret of soda in fractions, that I think I cannot convey a better notion of the quantity of sulphur present in the best known sulphur waters, than by framing the following table, in which the calculations of the amount of sulphur present are taken from Lersch's "Hydrochemie :"—

COLD SULPHUR.

	SULPHUR.	TOTAL CONTENTS.	TEMP.	ELEVATION.
Cambo . . . .	.012	32.4	..	..
Gurnigel . . .	.015	19.3	..	3,600
Weilbach . . .	.071	11.6	..	..
Uriage . . . .	.15	141	..	1,425
Langenbrücken .	.064 to .28	13.5	..	..

	SULPHUR.	TOTAL CONTENTS.	TEMP.	ELEVATION.
La Bassère . . .	.203	4.8	..	..
Nenndorf . . .	.326	27.6	..	..
Guagno . . .	2.8 to 4.3	..	..	..
Enghien . . .	.435 (?)	30.7	..	..
Harrogate . . .	.896	156	..	300
Challes . . .	1.2 to 2.2	8.4	..	..

WARM SULPHUR.

	SULPHUR.	TOTAL CONTENTS.	TEMP.	ELEVATION.
Aix-les-Bains . .	trace	28.8	108.5	765
Burtscheid . .	.0074	38	110.35—171.5	500
Aix-la-Chapelle .	.039	41	131—140	520
Eaux-Chaudes .	.048	3	75.2—96.8	2,100
La Preste . . .	.054	1.3	109—111	..
Amélie . . .	.095	2.7	87.8—147.8	810
Eaux-Bonnes .	.096	6	90.5	2,400
S. Sauveur . .	.097	2.5	70—109	2,525
Olette . . .	.124	4.3	80.6—172	1,700
Cauterets . . .	.135	1.8	71—134	3,254
Abano . . .	.078 to .154	65.9	71—185	..
Barèges . . .	.176	2.1	113	4,100
Vernet . . .	.177	2.7	93.2—136	1,860
Luchon . . .	.23	2.5	135.5	2,000
Acqui . . .	.229	63	100—167	..
Schinzach . . .	.475 to .87	26.2	96.7	1,060

Something must now be said on the difficult question of the *effect of sulphur* when taken into the system *by drinking*. The subject is made the more complicated by the discordance of opinion among authors.

Thus Lambron and others look on their effect as lowering and reducing the force and frequency of the heart and of the pulse, while at Barèges it used to be considered directly exciting. Then it is affirmed that different waters affect different parts of the system. Eaux-Bonnes, for instance, the respiratory organs; Eaux-Chaudes, the digestive;

Luchon, the skin ; while Barèges has a specific effect on old wounds and ulcers. Next there is a considerable amount of jealousy between French and Germans as to the value of their sulphur waters ; and in some cases we are forced to believe that when the quantity of sulphur present is so minute, the virtue of the water may depend mostly on the other salts it may contain, or on the temperature at which it is drunk. French writers have also laid much stress on a somewhat artificial distinction of sulphur waters, according as the sulphur is united with soda or with lime, and special virtues have been attributed to the presence of silicates in the Pyrenean waters.

Among all these conflicting views it seems scarcely possible at present to arrive at the truth.

The human system contains a good deal of sulphur, which is derived from the food in various combinations. Of the absolute physiological action of sulphur very little is ascertained ; its most palpable properties are, that it is slightly laxative, and that if it is long used, traces of it appear in the cutaneous transpiration. Its action is supposed to be analogous to that of hydrosulphuric acid. That acid is always generated in the system in certain quantities, especially in the intestinal canal. When inhaled in anything like a pure state, it is instantly poisonous ; when much diluted, its inspiration for a time is not deleterious : nay, it is possibly beneficial in certain conditions. In its poisonous effects it appears to act directly on muscular contractility, and thus on the heart, the respiration, and the capillary circulation.

The action of the sulphurets of potass, soda, and calcium seems to have much analogy with that of hydrosulphuric acid. It has been proved that the sulphur of sulphuret of potass is absorbed. It passes partly into the blood, where it soon gets oxidized. If too much is taken into the blood, the surplus seems to be deposited in the muscles and bones : it is eliminated partly through the urine, and partly through the breath and the perspiration, in the shape of hydrosulphuric acid. It has further been supposed, but this is purely hypothetical, that the alkaline sulphurets of the waters may render albuminates of mercury and of other metals retained in the system, soluble, and even that the sulphur combines directly with them, and so aids their elimination, which does not seem likely, as most such sulphurets are insoluble ; possibly, if they cause increased activity of the liver tissue, a quickened metamorphosis of liver cells and increased secretion of bile may afford a simpler explanation of their action. Sulphurets act more powerfully than sulphur itself.

Next, respecting the operation of sulphur waters, a few facts of a practical bearing have been ascertained. That they are on the whole rather constipating, their aperient action being the exception. It is doubtful whether sulphur has ever been detected in the air expired by patients or in their cutaneous transpiration. They all increase the amount of the secretion of the kidneys, some say of the quantity of urea. They do not improve the appetite, except at the commencement of their use, though they do not exactly impair it. The alvine excretions after a time get black and

offensive; iron sulphurets are found in them, procured either from the food in the intestinal canal, or from the blood, especially of the portal system. It seems further to be pretty well ascertained that, under the continued use of sulphur waters, enlarged livers diminish in size, and the system is apt to get anæmic. The theory of the anæmia has been supposed to be, that the blood-corpuscles may be diminished, owing to sulphur robbing them of their oxygen, in order to form hydrosulphuric acid. When their use is long continued, symptoms come on of what is called saturation, an inability to drink more without loathing, and among other affections even a certain catarrhal affection of the throat, which the French have called Grippe.

Sulphur waters are used internally at most spas, to aid the operation of the baths in the diseases about to be mentioned in the remarks on Sulphur Baths. In Germany they are considered to act favourably on the *hæmorrhoidal diathesis*, making the circulation of the liver more active, diminishing abdominal plethora and local hæmorrhoidal congestion: whether this opinion is derived from the use of sulphur in some popular remedies for piles, it is difficult to say, but it is widely spread in Germany, though not shared in by the English. On this account, and because the liver appears to be the great receptacle of metals, the sulphur waters are much drunk in metallic poisoning, and they have been considered useful in malarial cachexy and in enlarged spleen and liver.¹

¹ In England the cold sulphur wells have been found useful in some forms of dyspepsia, and even in granular pharyngitis. They have also a great reputation in chronic rheumatism and in gout, supported though they rarely are by baths. They have always been thought unsuited for pulmonary affections.

In early *tuberculosis*, and in some bronchial affections, the drinking of these waters, based probably on the ancient opinion that sulphur was a balsam for the lungs, particularly when warm, is used in aid of inhalations of hydrosulphuric acid.

The *inhalation of that gas*, which must always accompany more or less the use of the waters, either in drinking or in baths, even when systematic inhalation is not practised, calls for a few observations.

Sulphur waters seldom exhale hydrosulphuric acid without at the same time exhaling larger portions of nitrogen or of carbonic acid. It is therefore difficult to discriminate the action of each gas separately, as they are usually inhaled together. Experiments would seem to show that fully 2 per cent. of hydrosulphuric acid in the atmosphere may be inhaled without any injurious effect, but larger quantities exceeding 3 per cent. have produced nervous symptoms, with trembling, faintness, and retardation of the pulse.

Somewhat analogous effects are said to have been produced by inhaling the gas of various sulphur springs, but such statements must be received with much caution, when we consider the extremely small amount of hydrosulphuric acid usually present, for a water that may not contain more than 0.01 of a ten-thousandth part by weight is still considered a sulphurous water. It has been argued that if $\frac{1}{30000}$ part of a grain per cent. of hydrosulphuric acid in the atmosphere can be recognized by the organs of smell, 3,000 to 6,000 times as much, may have a distinct effect on the system. But we really know very little of the effects of such minute

quantities of matter, except in the case of the operation of some scents on peculiarly sensitive organizations.

When waters are pulverized and inhaled, it is extremely doubtful whether they ever penetrate beyond the larynx or the upper portion of the trachea at farthest. On the whole, therefore, we are not *à priori* to look for any very marked results from the inhalation of the gas, although its action is usually described as alterative and deobstruent.

We must next turn to the consideration of the *effects of sulphur baths*.

Sulphur baths of the temperature of 90° to 95° stimulate the skin, and excite the nervous system slightly, make the circulation more active, render the respiration lighter and easier, and produce a desire to make water. Sometimes their continued use causes languor and loss of appetite for a few days, even nervousness and loss of sleep; and baths, especially of a higher temperature, produce a slight eruption, to which much importance has been attached, called *la poussée*. A very slight degree of irritation of the conjunctiva is also said to be an occasional effect. Further effects are, increased frequency of the pulse (though the latest observers say it is retarded), increased cutaneous transpiration, even slightly increased temperature of the skin, while the urinary and bronchial secretions are augmented. The specific gravity of the urine is usually diminished, while the urea and uric acid are increased, and the phosphates and sulphates are lessened. The change of tissue is thus quickened, the sanguification is more rapid, and under these influences chronic indurations often disappear. The appetite and digestion are improved.

But instead of this tonic influence, the French believe that a certain number of sulphur waters have a sedative effect. Sulphur waters are, on the whole, believed to have a special action on the cutaneous and mucous surfaces. Such is about the standard account of these things, but exact observations are wanting.

Although it is the tendency of modern dermatologists to throw off all faith in sulphur waters, we cannot wait, if they are really useful, till a satisfactory rationale of their use is supplied, especially as dermatologists are far from being at one among themselves, and not even agreed about the classification of many of the commonest forms of cutaneous affections.

But whatever weight we attach to such theoretical considerations, I think that it must on the whole be admitted, that *cutaneous affections* are often benefited by sulphur waters, or by the treatment which they receive at some of the principal sulphur baths. Many chronic skin diseases—such as eczema, impetigo, prurigo, psoriasis, and lepra—frequently improve.

It appears to be mainly by their action on the skin, that sulphur waters have also been found useful as a sort of test for latent *syphilis*, their use frequently bringing out eruptions that were dormant. I have known something analogous, in the way in which sulphur waters have brought out patches of lichen circumscriptus of former years. As to the absolutely curative effects of these waters, they only appear in syphilis in its secondary forms, and then not very remarkably. Their employment in the form of baths, in such cases, is at most an adjunct to the use of iodide of potass, and of other remedies.

It seems to be admitted on all hands, that sulphur waters are useful in eliminating metals in cases of *metallic poisoning*; but as direct absorption of sulphur, and even of any quantity of hydrosulphuric acid, through the skin, is out of the question, this result, so far as it is not common to all other bath treatment, must be attributed to the drinking of sulphur waters.

Many of the sulphur, and especially of the Pyrenean waters, are counted very efficacious in functional *uterine* disorders.

The Pyrenean is far the largest group of sulphur waters known. There are 110 mineral water stations with 500 springs on the French side of the Pyrenees, and there are said to be more on the Spanish.

Before entering on the French Wells, I shall give a list of some of them, showing the amount of sulphur reaction by the sulphhydrometric test, and the amount of sulphuret of soda.

	SULPHUR REACTION.	SULPHURET OF SODA.
Challes	180	2.95
Marlioz	30 . . . . .	.67
Allevard	28 . . . . .	..
Luchon	23 . . . . .	.095 to .77
Uriage	22 . . . . .	..
Le Vernet	18 . . . . .	.12 to .59
La Bassère	18 . . . . .	.46
Amélie	13 . . . . .	.12
Barèges.	12 . . . . .	.220
Aix	8 . . . . .	..
Pierrefonds	8 . . . . .	..
Eaux-Bonnes	6 . . . . .	.21
Cauterets	6 . . . . .	.1 to .3
S. Sauveur	6 . . . . .	.21
S. Honoré	1 . . . . .	.03

Barèges, the most celebrated of the Pyrenean baths, owes nothing to the milder beauties of nature or to its climate, which is variable. Its inhabitants have to emigrate in winter. The supply of water is so scanty, that the wants of patients are with difficulty supplied. In spite of all these disadvantages, and though its cures are effected chiefly by immersion in crowded piscinæ, no waters are in greater repute for the cure of certain ailments ; and at the head of these stand, old wounds and cicatrices, and chronic diseases of bone : in them it certainly works wonders. In rheumatic and neuralgic affections the action of the waters is also powerful ; in fact, very much the same cases are treated here as at Teplitz. As the result of experience in the military hospital, it is said that chronic eczemas do pretty well, that psoriasis meets with temporary amendment. The stimulation of the waters has done good in engorgements from paludal poisoning. But syphilis here requires the regular treatment.

The waters, which are very feebly mineralized, and contain the half-organic substance *barégine*, are considered the most exciting of the Pyrenean baths. They are reported in the first place to excite the nervous system, and to aggravate chronic eruptions, affections of the nervous centres, asthma, phthisis, and recent wounds. No doubt the height of the place has a good deal to say in this. They are used for drinking, but their chief employment is in baths, of which there is tolerance after fourteen or fifteen baths.

The colder waters are first used, and then you go on to the hotter ones ; the temperature ranges from 87° to 113°. Barèges is reached in four hours by carriage from

the railway station of Pierrefitte, but it is only in very special cases that English are likely to resort to it. The arrangements and the water supply are better than they used to be. It has a very large military hospital, and the season is July and August and part of September.

Cauterets lies in a picturesque narrow valley on the banks of the Gave ; mountains shelter the place from winds, and render its climate mild and less variable than might have been expected ; its wells are very numerous and scattered. Besides many other ones, it has three chief establishments—the old bath of Cæsar and the *Espagnols*, in the centre of the town ; that of *La Raillière*, on the hill above it ; and the magnificent new bath establishment of *Les Œufs*, across the bridge on its outskirts. It may well be proud of this last establishment.

Though its baths are used for all the purposes for which other sulphur waters are employed, the reputation of *Cauterets* rests chiefly on its beneficial effects in atonic tubercular and in bronchitic affections. The spring *Mauhourat* has a decided action on the kidneys, and expels the urates. *Cauterets* has a great name in the diseases of women, who employ the waters in baths and in local douches, and also drink them. It is certain that mules in *Tarbes* and *Pau*, suffering from bronchial catarrh and from diarrhœa, when sent up to *Cauterets*, mend rapidly.

The baths may be divided into three groups—the eastern, the western, and the southern. Of all the springs, *La Raillière* is far the most frequented ; and the crowd of patients, in the most different costumes, ascending the hill to

it in every variety of conveyance, but now chiefly in omnibuses, is one of the most amusing scenes in the Pyrenean baths. The season commences in May and lasts till October ; it is often very crowded ; as many as 15,000 guests have visited it in a season : it is reached in two hours from Pierrefitte.

St. Sauveur, at a height of 2,525 feet, with not so unsettled a climate as many mountain places, appears to have little sulphuretted hydrogen in its waters, but is a fashionable bath. The water is soft and pleasant to the skin. In many respects it may be considered the French Schlangenbad. It is good for nervous patients, likewise for complaints of females, and is essentially a ladies' bath ; it has the advantage of being close to some of the finest scenery in the Pyrenees. The temperature of the water varies from 81° to 135° , and it is chiefly used in baths, although it is also used internally, often mixed with milk or gum-arabic. It is a very pretty, picturesque spot. The season commences in May and ends in October ; it is also reached in little more than two hours from Pierrefitte.

Eaux-Bonnes, like its neighbour, *Eaux-Chaudes*, is reached by diligence in five hours from Pau. It lies in a narrow gorge, has been greatly improved of late years, and is very lovely. The climate is mild, but the alternations of temperature make it necessary for patients to be warmly clad here as in all the Pyrenean baths. It has a very large concourse of visitors. It has become a great place of resort in consumption, mainly for cases of atonic phthisis, also in clergyman's sore-throat, and in laryngeal affections. It has got a bath house with inhaling rooms.

Eaux-Chaudes, subject to rather sudden changes of temperature, is situated in a savage, picturesque, and very narrow and gloomy gorge, where the houses can scarcely find room. Notwithstanding its handsome thermal establishment built of marble of the Pyrenees, it is not very much resorted to. Although it is used for chronic rheumatism and for chlorotic complaints, its baths seem mostly to serve as a supplement to the neighbouring *Eaux-Bonnes*, where the waters are chiefly drunk, partly because the supply of them is rather scanty. The season is from the 1st of June to 1st of October.

Bagnères de Luchon.—Climate mild, but, like most Pyrenean ones, changeable. This and the *Bagnères de Bigorres*, and *Cauterets* and *Eaux-Bonnes*, are by far the most important of the Pyrenean baths for the English, as they are the only ones which supply all the comforts they look for. With the exception of not being aided by the Alpine air of some of the higher stations, owing to their being only 2,000 feet above the sea, the various sources of Luchon produce all the effects that are to be expected from sulphur waters. They are situated in the midst of the most magnificent scenery. The bath establishments and drinking arrangements of Luchon are excellent, although they have of late been eclipsed by the newer establishments of other stations. The waters of Luchon and of some other sulphur baths have the property of getting white or milky after exposure; this is from the precipitation of sulphur, but chemists have not made out very distinctly the cause of this phenomenon, which varies in different springs.

They profess to cure here all the complaints just mentioned as being treated at Barèges and Cauterets ; but they are specially successful in skin affections. It has also been thought that these waters were particularly adapted for hemiplegia and the effects of cerebral lesions. Each of the many wells is believed to have peculiar virtues, and to be most useful in particular forms of disease ; but such details cannot be entered into at present.

Piscinas or common baths are still in use here and objected to by many, but infection through such sources is absolutely unknown. Luchon has also a chalybeate and an acidulous spring in its vicinity. It is reached from Montréjeau in 3 hours 15 minutes, but it is hoped that the railway will open this spring. The season of this very enjoyable place is from 15th June to 15th September.

Amélie les Bains, about 800 feet above the sea, reached in four hours by carriage from Perpignan, lies romantically, with lofty masses of rocks impending, and streams flowing from them ; it deserves notice, chiefly as one of those places in which every possible arrangement has been made, for presenting the fumes of sulphuretted hydrogen to the patient in a variety of ways. The temperature of the springs varies from 92° to 145°.

Dr. Champouillon says that the waters here stimulate less than at Barèges. Chronic rheumatism improves, and simple eczema and even psoriasis give good results. The French have one of their permanent military hospitals.

It is resorted to for rheumatism, but more especially for the early stages of pulmonary consumption ; and, owing to

the mild climate of the place, patients are able to stay there during the winter. Dr. Champouillon believes that the dryness of the atmosphere is apt to produce hæmoptysis, while under it catarrhal cases improve. The waters were of most use in the early manifestations of phthisis, and more in those under the age of thirty-five; but he attributes as much to the effects of the climate as to those of the waters. He thought the pulverization of water useful in laryngitis, but its results in phthisis to be purely negative. These opinions of an unprejudiced military surgeon are worth having.

Amélie les Bains may be considered as a representative of the sulphur baths of the Eastern Pyrenees. They do not differ in essentials from other baths, except in their mild climate, and therefore in being, some of them, fit for a winter residence for invalids. But though Amélie has a milder climate than many inland stations, it is much colder than the shores of the Mediterranean. It is too open to the east, and is too soon hidden from the sun.

Very hot vapour baths and inhalation rooms form an important part of the curative process, and are to be had very conveniently in Dr. Poujaud's well-ordered establishment. The treatment is mainly by bathing, but the waters are also drunk, and are believed to increase the secretion of urine, and even favour the solution of gravel. It is complained, that they do not understand mulling and kneading the muscles here. Notwithstanding that all writers are agreed in praising the arrangements of this place, it does not appear yet to have received a propor-

tionate number of annual visitors, but of late years over 400 have spent the winter at it. The regular season extends from May to the end of October. Living is very moderate.

Le Vernet, with many points of resemblance to *Amélie*, lies higher, at an elevation of 2,000 feet; like it, it has of late years become a place of winter resort, but, though sheltered from the east and from the enervating south wind, it is open to the north, and in December and January, owing to the neighbourhood of the mountain of Canigou and others, it only sees the sun for one hour or two. But to make up for this, there are inhalation chambers of regulated temperature, for winter patients, and the climate is very pleasant in spring and in autumn.

Olette, on the route from Perpignan and Prades to Escaldas, and reached by diligence from Perpignan, lies at a height of more than 1,800 feet on the river Tet. The neighbouring scenery is mountainous. *Olette* is remarkable for the quantity of its sulphur springs: they vary in temperature from 81° to as much as 136° . There are no fewer than twenty-one springs; and so abundant are they that it has been calculated that 9,000 baths could be supplied daily. There is a small bathing establishment with medical inspector and his assistant. The waters are used mainly for rheumatism and skin complaints. Out of the way though the place is, a few English have found it out. Living in such places as this and Escaldas is very cheap.

Escaldas, up among the higher mountains, with waters of from 90° to 106° , is also very picturesquely situated, not very

far from Ax. Though remote in situation, it receives a contingent of 700 visitors every year, chiefly from across the Spanish frontier. In spite of its high position, its climate is mild during the season ; it is resorted to for bronchial catarrhs as well as for skin complaints. It is reached from Perpignan.

La Preste is high up in the mountains, along the river Tech from Amélie. It can only be reached by mules, and, though within French territory, is quite Spanish. It is situated in a savage gorge. The well is of the temperature of 118°. The supply of water is ample. It is chiefly used internally for lithiasis and catarrh of the bladder. Its season is from June to the end of August. There are interesting grottoes with stalactites.

Ax, in the Eastern Pyrenees, has, perhaps, the largest supply of thermal sulphur waters in Europe, and the hottest in the Pyrenees. It is as picturesquely situated as Luchon ; and though the village is a miserable place, very fair accommodation is provided for visitors, who now reach an annual average of 2,500. Although it is declared by chemists that the waters of Ax have not quite so much sulphuret of soda as those of Luchon (the quantity in the latter not amounting to one grain in the sixteen ounces), I think it is of very little importance, as there is no doubt about the extrication of an abundant supply of hydrosulphuric acid. There are three bathing establishments, and a military hospital. It is reached from Foix, on the railway.

France, so rich in thermal sulphur springs in the Pyrenees, is not so well supplied with cold ones. I shall only mention

three or four, because they are not nearly of so much importance as the thermal ones.

La Bassère.—The cold spring of this place contains more sulphur than most of the Pyrenean waters, having .356 grains of sulphuret of sodium. It has been conveyed some four miles into Bagnères de Bigorres, where as many as 800 people sometimes drink it of a morning.

Visos, a cold sulphur and bituminous spring, near St. Sauveur, is a good deal drunk by people frequenting that bath. It has no establishment ; and has a great reputation in ulcers and old wounds, also in chlorosis, because it is believed to contain iron. It is exported.

Two cold sulphur wells may be added to the other ones of the Pyrenees, though not very important, and are feebly mineralized :—

Cambo, not far from Bayonne, and used by its people.

St. Christau, in the valley of the Asp, about ten miles from Pau, has been a good deal brought before the world of late years, but it is more of a hydropathic establishment. It is considered to be useful in chlorosis and cutaneous affections ; and as a speciality its water has been used pulverized in granular ophthalmias and affections of the eyelids. A great deal has been made of the small quantities of copper, iron, and arsenic found in its waters. We quit the Pyrenees.

St. Honoré is almost the only sulphur well in the centre of France. It is 1½ hours' drive from the nearest railway station. The water is abundant, of the temperature of from 78° to 82°. The mineral contents are 6.74, and the quantity of sulphur is very small. Of late years a very handsome

establishment has been erected, and it has been brought forward as a rival to Eaux-Bonnes in cutaneous and uterine, and especially in pulmonary affections, but its waters are not hot enough.

For the same reason as being the only sulphur waters in that part of the country (Normandy), the use of the waters of *Bagnolles de l'Orne* has been revived. It is now only about an hour's drive from the nearest railway station. It is situated in the centre of a rocky forest, and has large, comfortable establishments and appliances of all kinds. The mineralization is rather feeble, and there is not much sulphur present. The water, of the temperature of 80°.6, supplies one of the largest swimming baths in France.

There are three good iron springs, but without carbonic acid. The diseases specially treated here are dyspepsias, skin affections, injuries to the bones and joints, and neuralgias generally. Life is very quiet at this place.

Enghien, with its pretty lake, is not far from Paris, and has indeed become almost an *annexe* to it. It has mild sulphur waters, used both for drinking and for bathing. They have the usual effects of sulphur wells; but as English in search of health are not likely to stop short at Enghien, I only add that it possesses the latest appliances.

Pierrefonds, 1½ hours by omnibus from Compiègne, on the railway. Like Enghien, it lies on the borders of a lake, above which is a fine ruined castle. The water is a weak sulphur one; but beside it, as may be seen in other places, is an iron one. The place has been brought into notice of late years, from M. Sales-Girons, the inventor of the

pulverization of water for purposes of inhalation, practising here. The place has improved rapidly, and pretty villas have been springing up.

Challes, a couple of miles from Chambéry, has one of the most remarkable waters in Europe, but there is no establishment, and it is chiefly exported. The water has scarcely any smell on emergence, yet it is the strongest sulphur well known. It has also some iodine and bromine—sulphuret of sodium, 2.9 (or 5.5 ?) ; bromide of sodium, .10 ; iodide of potass, .099.

Aix-les-Bains.—Well known to the Romans, and still containing their remains. The water is singularly free of mineral contents, and has but a trace of sulphur, .04 of hydrosulphuric acid. There is no alum in the so-called well. There is probably no sulphur bath where the arrangements are more complete than here. Separate baths, baths in common, baths for men and baths for women, every variety of douche and of vapour baths, not forgetting the local and general application of water and of steam, and inhalation chambers, are all met with. The supply of water of a high temperature is so abundant, that there is no necessity for utilizing it carefully as in places like Barèges. Add to this, that the town is in a beautiful neighbourhood, and very near some of the pleasantest scenery in the Alps, that living is moderate, and that there is agreeable society, and it will be found on the whole to be one of the most convenient places to which the English can resort. It is reached by railway from Lyons or from Geneva, being on the main line to Mont Cenis. Aix can be visited earlier in the season than some of

the more northern baths. It gets hot in July and the first half of August, but after that can then be visited again. Everything that can be effected by skill in application of thermal waters, is to be obtained here. I shall say nothing in detail of the diseases treated, except that rheumatism and metallic poisoning are among the most common.

If Aix has scarcely a right to be called a sulphur bath, its deficiencies are supplemented by the fairly strong sulphur waters of *Marlioz*, a pretty little village, a quarter of an hour's drive from Aix, which is nicely laid out, and makes a pleasing variety from Aix. It has extensive arrangements for pulverizing its waters and for inhaling-rooms, and is trying to establish a name in laryngeal and bronchial affections.

Allevard, in a beautiful Alpine valley, between 1,400 and 1,500 feet above the sea, with very charming scenery, one hour's drive from the Grenoble railway, has risen into importance within the last forty years, as a cold sulphurous spring. Its hotels overflow with visitors.

There is some difference of opinion respecting the constitution of its waters. The mineral contents are very small : while they contain quite as much hydrosulphuric acid gas as Eaux-Bonnes, these springs have a great deal more carbonic acid. It is said that the presence of this large quantity of carbonic acid makes the waters sit more lightly on the stomach than most other sulphurous ones ; while the quantity of nitrogen also present, is of use in the cold inhalations of the hydrosulphuric acid, which are practised here, as well as warm ones, with great success in affections of the chest. These waters are employed in all cases in which sulphur

waters are used, but specially in the diseases of the respiratory organs. The arrangements are excellent, and the place is well worthy of being better known to the English. There is a whey cure.

Uriage, in a pretty valley about 1,500 feet above the sea, not far from Grenoble, has its water of the temperature of 79°, and, if the analysis of it can be trusted, one of the strongest salt waters in France, but it contains so much of purgative salts as scarcely to justify its being placed here. Its main constituents are common salt 72.3 parts, sulphate of magnesia 25.6 parts, ditto of soda 22.9 parts, ditto of lime 18 parts, also some hydrosulphuric acid. There is an excellent establishment, with inhalation rooms.

These waters are celebrated for the treatment of chronic affections of the skin, in which the use of the bath and the application of the water to the skin locally, are the most important parts of the treatment. They are also much used in scrofula and in glandular enlargements, and in mucous catarrhs. If they had been in Germany, they would undoubtedly have been employed in congestion of the liver and sluggish states of the abdominal canal, for which they are particularly fitted.

There is also an iron spring. The place consists of the bath establishment and hotels; there is no village. It is a very picturesque part of France, little known to English, but has many attractions, and there is a very considerable resort to these waters. I found it overcrowded.

In these days, when the magnificent island of Corsica seems likely to be opened out as a health resort in chest

complaints, its mineral sources must soon attract notice. It has various excellent sulphur baths, which have been long in use.

Pietrapolo, temperature 110° to 146° , much and increasingly frequented, with good arrangements; fine thermal establishment, and in picturesque country among the mountains.

Guagno, temperature 105.8° , although selected for a military hospital, is represented as gloomy, and the arrangements are very imperfect, but are being improved. It lies among high mountains and forests.

Guitera, temperature 104° to 131° , with an immense supply of water, is very promising, but accommodation for visitors has still to be supplied. At present it is a filthy hole.

Puzzichello, cold, has great local reputation and very fair arrangements. Its effects are said to resemble much those of Schinznach, and it is used mostly in cutaneous affections, but its low situation exposes it to the effects of malaria at certain seasons of the year.

There are many excellent thermal sulphur springs in Spain, but most of them in out-of-the-way places, as in Galicia, quite out of the beat of the English. One near Santander is the least remote. While the arrangements of most of the Spanish baths remain as they are, it is only very adventurous people, who will venture to any of them far removed from the railway lines. Some of the chief are:—

	TEMPERATURE. DEGREES.
Archena, in Murcia	126.5
Cuntis, near Pontevedra	68 to 140
Carballo, near Corunna	77 to .97

	TEMPERATURE. DEGREES.
Cortegada, near Orense	84 to 90.5
Ontaneda, near Santander	77 to 100
Ledesma, near Salamanca	86 to 122

The first of these has a special reputation in the cure of syphilis, and the last is one of the most frequented baths in Spain.

Caratraca, some leagues from Malaga, is probably the most visited watering-place in Spain. The country about is beautiful, the climate delicious, and there is plenty of amusement to be had. The water, of a temperature of about 66°, is but feebly mineralized, but it enjoys a great reputation in skin complaints, in scrofula, and in bronchial catarrhs. It has also a special reputation in syphilis. Spanish physicians continue to maintain that its waters, and those of Archena, have, unaided, a direct curative effect on that disease. It is used for drinking, bathing, vapour baths, and injections. Season from 15th June to 30th September.

There are also *Ormeztaguy*, cold sulphur, near Tolosa, and *Santa Agueda*, to be mentioned again for its iron waters, belonging to the group of wells near San Sebastian, so worthy of further investigation. They are much resorted to by the Spaniards.

Baden in Switzerland, on the railway near Zürich, is one of the oldest and most visited baths in Europe ; but rather a resort of French and Swiss than of English. It is in a pleasant country, and the arrangements are very convenient, the waters being abundant, and baths attached to all the hotels. The town is somewhat old-fashioned. There is

no great variety of amusements, and it is a place only to be visited by those who really have need of its waters. It is indeed difficult to realize to oneself, that for some centuries Baden was the centre of dissipation and amusement in Europe. The quantity of hydrosulphuric acid in its waters is very trifling. Their effects, therefore, are chiefly those of thermal waters ; they are also used for drinking, but the eighteen parts of common salt are balanced by quite as many of sulphate and carbonate of lime ; so that it is not surprising that it is not borne well by many stomachs. I do not know that there is any speciality of treatment here, except that the baths are used of a high temperature, and are prolonged. Douches and vapour baths are actively employed. One cannot but be amused at the praises lavished on the many delights of Baden by Meyer-Ahrens, but he will not convince the world that the place is not dull.

Schinznach, only a few miles from Baden, is more picturesquely situated, and has more complete public arrangements. Here there are no private hotels, the whole establishment belonging to the canton; the arrangements are excellent, but this also is a place only to be visited by invalids. The waters contain more sulphuretted hydrogen than most baths on the Continent, excluding some Hungarian ones ; but their temperature not being high, it is necessary to heat them. At Schinznach they pay much attention, and successfully, to cutaneous disorders. The quantity of lime is much less than in the waters of Baden, and there are in the 26.2 parts of solid constituents some

13.5 parts of sulphate of soda, besides other soluble salts, so that some effect may be produced on the digestive organs by their internal use, especially with the additional employment of the strong chloride of sodium water of the neighbouring *Wildeggen*, which contains some iodine.

Some Swiss springs of ordinary temperature will next engage our attention. Their establishments are on a small scale, and chiefly resorted to by the natives ; but they are in the midst of such beautiful scenery, and some of them, such as Gurnigel and Le Prese, are so elevated, that it is surprising the English do not oftener turn aside to them. The arrangements in all have rapidly improved of late years. But they are all on quite a small scale after the baths of Germany and of France.

Stachelberg lies at the height of about 2,000 feet, at the end of the Lin Valley, in Glarus, in some of the finest and grandest scenery in Switzerland, two hours' drive from the Glarus railway station. Its waters only contain about 5.3 parts of mineral constituents. They contain, however, a fair amount of sulphur, .79 of sulphate of sodium, and .15 of hydrosulphuric acid. The place is immensely crowded in the season. There is one large comfortable establishment, in which the patients live. Drinking the water and bathing in it are both practised, and the diseases, especially the cutaneous ones usually treated with sulphur waters, are the subject of treatment here. But affections of the chest are specially benefited by the waters, mixed with milk or whey. There is a whey cure.

Lenk, near Weissenburg, is a promising new bath.

Gurnigel, which has of late risen into importance, lies among the mountains to the right as you go from Berne to Thun. It is 3,850 feet above the sea. The waters contain sulphate of lime. They drink the water in large quantities; but when they exceed ten glasses per diem, symptoms of saturation occur. These waters are used much in dyspepsia and hypochondriasis, in congestion of the liver, and in bronchial catarrh. There is a handsome bathing establishment, and also provision for the poorer class of patients. There is a chalybeate spring also.

Heustrich is in a valley not far from Thun and the lake of that name. It is distinguished from most other sulphur springs by containing a little carbonate of soda, indeed very nearly 7 parts. To this, mainly, its efficacy in chronic bronchial catarrhs is attributed. In these it has a very great reputation in Switzerland. The arrangements are most comfortable.

Le Prese, a little off the high road from the Engadine into Italy, with romantic scenery and a beautiful little lake 3,000 feet above the sea, is completely sheltered from the north and north-east, and enjoys a wonderfully mild climate. The waters contain sulphate of lime; but they are only feebly mineralized. Now that travellers bend their steps so much towards the east of Switzerland, this place may meet with the attention it deserves. Good whey is supplied, and baths of whey, and also the fresh *kräutersäfte* are to be found. A sheltered place like this, at so considerable an altitude, may be found useful in pulmonary affections.

Switzerland is wonderfully rich in sulphur waters; many

others might be mentioned, such as *Alvenen*, on the road by the Albula pass from Chur to St. Moritz. It lies in a magnificent valley at the height of 2,430 feet. A very comfortable bath establishment has been built of late years. It is a weak sulphur well with some sulphate of lime.

Baden in Austria is one of the largest and most crowded baths in Europe, and all the arrangements are on a magnificent scale. There are enormous swimming baths, and common ones, in which ladies and gentlemen spend many hours together. They are surrounded by balconies, from which their friends can view and converse with them, as in the old days at Bath.

It is a place of great resort to the people of Vienna, not much visited by the English, and is more one for strangers to go to see, than for those who are seriously in quest of health to resort to. Its waters contain more sulphuretted hydrogen than those of its Swiss namesake, but their temperature of 95° does not come up to the high temperature, 115°, of the latter. They appear to contain as much sulphuret of soda as the strongest Pyrenean waters, if they possess .52 of sulphuret of sodium.

Hungary is rich in sulphur waters, and, if their analysis can be trusted, some of its springs are among the strongest in Europe. I can only mention two of those eastern baths.

Ofen, a suburb of Buda, on the Danube, is interesting as its waters were used by the Romans, and, as some of the baths which the Turks erected during their occupation of the place, are still in existence.

The springs are four in number, varying in temperature

from 110° to 140° ; they contain but little sulphur, and from 7 to 13 grs. of solids, one-half of which is calcareous. The Kaiserbad is the most important of the baths, and is fitted up most comfortably. The old vapour baths of the Turks are kept up, which men and women in very scanty clothing make use of together. Of late years the strong purgative waters of Ofen have come into notice.

Mehadia, or the baths of Hercules, known to the Romans, are situated in the Banat, three miles from the Danube, at Orsov, and lie in a romantic valley, or rather in a deep glen of limestone.

The springs have a temperature of from 70° to 144° . The quantity of chloride of sodium varies in them, rising in the Kaiserquelle to as much as 40.4. It has .52 by weight of hydrosulphuric acid.

The same cases find relief here as at Aix-la-Chapelle, and it has an immense special reputation in old anchyloses and in stiffened joints. The waters are used very hot.

The accommodation is fair, but the visitors are chiefly of the poorer class, although it is perhaps the most visited of these baths. The fact is, that the richer Hungarians prefer the variety of a visit to foreign baths. The climate is excellent, and the resources of the place capable of development.

Aix-la-Chapelle, or Aachen, in Rhenish Prussia, on the route between Antwerp and Cologne, has, owing to its abundant supply of waters of high temperature, long been the chief sulphur bath of Germany, and is well known to the English. The arrangements of every kind are excellent, and the douches certainly second to none in Europe.

Every effect that sulphur baths, not at a great elevation as some in the Pyrenees, can produce, may be procured here, but rheumatism and cutaneous affections are the complaints probably most successfully treated ; being a bath of established reputation, it has a staff of very experienced officers, whose practice in a large city like Aix is not limited too much to one set of diseases, as at most baths.

The waters of Aix-la-Chapelle owe a good deal of their virtues to the chloride of sodium, 26 grs., which they contain. The source "Elisen" is the most used for drinking ; it is disagreeable at first, but people get accustomed to it, and even like it. They begin with 6 or 8 ozs., and increase it gradually to three or four times that quantity. As its temperature is about 110°, patients walk up and down, tumbler in hand, till it cools.

Besides having the general operation of sulphur sources, the water of Aix-la-Chapelle contains enough of salt to make it produce many of the same effects as Wiesbaden and other thermal salt waters ; so that the operation of its springs, when drunk, is believed to combine the effects of salt and of sulphur waters. While Weilbach has got a special name for the treatment of phthisis, associated with fatty liver, and of cases of enlarged liver, it is difficult to see why the same cases might not be treated with advantage at Aix-la-Chapelle. The former certainly has somewhat the advantage in point of climate. Aix water has of late years been exported a good deal.

The season lasts from June to the end of September, but the baths are open all the winter, and owing to their excel-

lent arrangements may be very well used at every season. The new Kaiserbad is in all respects one of the most complete in Europe. The chief disadvantage under which Aachen labours is that, owing to the prosperity of its manufactures, the town has greatly increased in size, and become so large, that those who visit it have not the advantage of large pleasure-grounds or shaded walks near the wells, which they have in some other baths.

Burtscheid, close to Aix, has waters essentially the same. The hottest spring is 166°. There is scarcely a trace of sulphur in the waters. The Koch-brunnen contains more carbonate of soda than Neuenahr and the feebler alkaline thermals.

The Rosenbad establishment, with its pretty garden, makes a pleasant change for those who get tired of the town of Aix.

Five cold springs that are much used in Germany agree, in the main, as to the mode in which they are employed. They are little known to the English. They are much cheaper and quieter than the places they like to frequent. Two glasses, gradually increased to six or eight, are drunk before breakfast. In all, I believe, there are inhaling rooms, where the hydrosulphuric acid has been separated from the waters, and is used mixed with a large amount of atmospheric air. In other places aqueous vapour is impregnated with gas. These are :—

Weilbach, in Nassau, where the operation of sulphur waters used internally has been chiefly studied. The water is exported. Though easy of access, it is not a very tempt-

ing place of residence, as there is no neighbouring village or town, and patients must live in the establishment, which is in itself well managed. There is a spring with some lithia.

Nenndorf, in Hesse, with waters containing as much as 1.01 of hydrosulphuric acid, sulphur mud baths, inhaling apparatus, and whey cures, and also salt-baths, in a pleasant country, with good arrangements.

Eilsen, in Lippe-Schomburg, with .89 of hydrosulphuric acid, offering much the same things to its guests, lies in a pretty open valley, but not much frequented.

Meinberg, in Lippe-Detmold, offering in addition, sulphur mud baths, a carbonic acid and a pneumatic apparatus, and situated on a pleasant spur of some wooded hills, on a larger scale than the others, and holding out more inducements to visitors, and, with its drinking well, containing so much salt, that it might be counted among salt waters. Approached by Paderbon or Herford.

Langenbrücken, in Baden, lies in a pretty valley between Brucksal and Heidelberg, and its waters contain a fair amount of sulphur. It has a considerable concourse of visitors, although the accommodation for them appears to be limited to what the *Kurhaus* supplies.

To these must be added some feebler wells in the country from Stuttgart to Tübingen, quiet places known chiefly to the natives of the country :—*Boll*, *Reutlingen*, *Sebastiansweiler*, *Hechingen*.

Italy can boast of many excellent thermal sulphur springs.

Acqui, not very far from Alessandria in the north of Italy, has been used at least since the days of the Romans. There

are many springs, of which the most abundant emerges at the high temperature of 169° . Its main constituents, besides hydrosulphuric acid, are chloride of sodium and a little lime. The water is limpid, and soon parts with its smell of hydrosulphuric acid. These waters produce all the curative effects of other hot thermal waters; and they are remarkable in another respect, as being like the baths of Abano and of St. Amand, the prototypes of the German mud-baths. The favourite method here, is for the patient to have the affected parts covered with a layer of the *fanghi*, a soft incrustation, brought up by divers from the bottom of the well. An abundant vapour exhales from it, and converts the room into a regular vapour bath. A patient remains with the part enveloped for three-quarters of an hour or an hour, after which he cleanses himself in a bath of the mineral waters.

The baths of *Abano*, the ancient *Apona*, are only a few miles by railroad from Padua. There is scarcely any bath in Europe, of the early history of which we know so much. Its springs were early divining wells. Tiberius, before he became emperor, tried his fortune by dropping dice into the fountain. Claudian wrote an elaborate poem on the waters, and we have the orders issued for the restoration of the baths by King Theodoric in the sixth century.

Notwithstanding all this, the value of the springs is appreciated only by the natives of the country. English will not visit them until there is improved hotel and bath accommodation. There are several rather rough bath establishments. The springs are very abundant, and the

temperature of the highest is 185° ; in spite of which great heat, confervæ, and bacteria breed in it, as was observed long ago by Pliny.

The chief springs rise at half-a-dozen spots in a curious volcanic mound. The waters are used for baths and douches, and an important part of the treatment is the local application of the mud which the waters deposit. The waters are scarcely drunk at all, though they contain 38.7 of chloride of sodium.

The climate is mild and temperate ; in fact too warm for the English in summer.

The accommodation at *Battaglia* or St. Elene, some six miles distant from Abano, is a good deal better ; in fact is very fair in the establishment, and the neighbourhood is very pretty.

There are many springs of similar nature in other portions of the picturesque Euganean hills.

The sulphur waters of *Valdieri* are weak, but they deserve notice on account of their elevated situation. They are in the Col di Tendi branch of the Alps, fifteen miles from Cuneo the nearest railway station. From it you can travel about half the distance by carriage : for the remainder you require mules or porters. The country is beautifully wooded. The baths are 3,400 feet above the sea. There is a large establishment calculated to hold 450 to 500 guests. During the summer months the weather is usually settled. The atmosphere is cool at that elevation. The season is from the end of June to the end of August.

There are several cold as well as thermal springs : their

temperature varies from 78° to 147°. Their mineralization is only 2.4. They are therefore, properly speaking, very pure indifferent waters. One of the springs is a tolerably strong sulphur one. The *fango*, or earthy deposit from the water, is much used here, as in other Italian baths. But the speciality of Valdieri is the *muffe*, or vegetable slime from low forms of plants which flourish in water of that high temperature. Insects breed in a temperature of 112° to 122°. Affections of the skin, rheumatism, and scrofula are the diseases most treated here. The place has much to recommend it as a summer health-resort.

There are many other Italian sulphur springs, but most of them are in a state of neglect. One belongs to the very interesting group of springs near *Viterbo*. The sulphur waters of *Mondragone*, in old days the soft luxurious Sinuessa, appear to be very strong of their class, but the district suffers from malaria, and there is no accommodation for visitors.

Great Britain, poor in thermal springs, is richer in sulphur ones.

Harrogate,¹ with the most important drinking waters in England, and having claims to be considered a sulphur, a salt, or a chalybeate spa—and the *Tewitt* and some others are pure chalybeates—has kept up its reputation ever since it was discovered. The place itself is not strikingly attractive, but agreeable excursions can be made from it. It is about 300 feet above the sea; the air is bracing, and

¹ For fuller information respecting Harrogate and other English springs, I beg to refer to "Our Baths and Wells," 1871—being the most recent work on the subject.

those who find the upper part of the town too much so, can reside in the lower and more sheltered part. There are excellent pump-rooms, and a large well-equipped bathing establishment has been lately completed. A medical friend, in whose judgment I have much confidence, says that the Victoria baths are magnificent, but comfortless.

There are numerous wells. The Old sulphur well, with 123 grains of salt, has 12 of lime and .8 of sulphur ; while the Mild sulphur well has 36 grains of salt, 5.5 grains of lime, and about .13 of sulphur. There is therefore considerable choice between these waters, and the Kissingen spring is a convenient one of intermediate strength.

A recent practical writer, who has had ample experience of Harrogate, Dr. Myrtle, represents the action of these waters, taking the strongest as his type, as stimulant ; increasing the secretions from the stomach and the intestinal canal, acting also on the liver not only as a cholagogue, but promoting a healthier activity of its functions ; as an aperient, acting comfortably, and often removing habitual constipation ; as a resolvent, causing rapid absorption of the fatty tissue in cases of obesity ; nay, even reducing chronic hypertrophy of the uterus, and gradually reducing glandular indurations and gouty and rheumatic swellings. He finds the purgative action of the water not so lowering as that of sulphates, citrates, and tartrates of magnesia, potash, and soda. Many patients take it in medium doses with comfort for weeks together. Usually it is not given for more than eight days to three weeks, but in some cases patients have expressed a liking for it, after it has been

daily taken in full doses for weeks and even months, while the patient shows no sign of being weakened by its use. If taken injudiciously, however, it produces, as the French would say, symptoms of saturation, constitutional disturbance, characterized by loss of appetite, thirst, giddiness, drowsiness, headache, biliary derangement, and fever.

A pint to a pint and a half taken in half-pint doses at intervals of fifteen or twenty minutes, beginning an hour or an hour and a half before breakfast, is generally sufficient to produce its aperient action. To secure its alterative action, from two to eight ounces are taken cold three or four times a day. When the digestion is weak the water is prescribed warm, as when taken cold it lies heavy on the stomach. The class of patients that improve most at Harrogate are cases of faulty digestion and assimilation, arising from purely functional or organic causes, or from a mixture of both, also men suffering from failure of nervous force consequent upon over-work.

Who can fail to observe that these are exactly the same class of cases that benefit so much at Homburg and Kissingen by their salt, or at Uriage by their saline-sulphur waters? The action of the sulphur in the Harrogate waters is believed to show itself chiefly in cutaneous affections, which are a good deal treated there, and when the waters are used as baths; but the systematic application of baths does not appear to be well understood at Harrogate.

The best time for taking the Harrogate waters is from May till the end of September. But patients may drink and also bathe at any season with advantage; Harrogate,

however, is not a place for delicate people to go to in inclement weather. The great resort of visitors to Harrogate is, I believe, from the west of Scotland and north of Ireland.

Gilsland Spa, near the borders, on the railway between Carlisle and Newcastle, is prettily situated in a broken country, in the neighbourhood of the old Roman wall, and of one of its most remarkable stations. According to old analyses, the well, while very free from mineral constituents, would seem to contain a very considerable proportion of hydrosulphuric acid. *Gilsland* has also an iron spring. The waters are believed to be useful in dyspepsia, chronic rheumatism, and skin complaints.

The place is much frequented in autumn, chiefly by people from Liverpool and the West of England. If the waters be not very powerful, yet I know no place in England where people of moderate means can get more in the way of pleasant relaxation, often as useful as medicine, than here. That the cases of illness treated are not very acute, seems plain from the fact of there being no resident doctor.

Shap, near Penrith, on the railway, in an open country, has a sulphur spring, baths, and hotel, is a good deal frequented, and deserves to be better known, especially with reference to its elevation of some 1,000 feet above the sea.

There is a group of sulphur springs in Wales, which has lately been opened up by the railway. The chief of them is *Llandridnod*, in a healthy open plain, with fine distant views. This place, known for more than a century and a half, has been lately revived. There are saline, sulphur, and chalybeate wells : each of them contains about 37 grains of

common salt, and the sulphur spring is believed to have a good supply of sulphuretted hydrogen. It resembles the mild sulphur well of Harrogate very closely. At the present moment Llandridnod is rising fast in popular favour. New establishments, and hotels, and houses have sprung up, a small artificial lake has been recently added, care has been taken to improve the pump-room, and there is now a resident doctor.

Moffatt, in the south of Scotland, in an interesting country, with a somewhat damp climate, has long been a favourite watering-place. It contains, like Harrogate, only in a minor degree, a good deal of chloride of sodium, about as much as Aix-la-Chapelle. Its chief constituents are : sulphur, say .15 ; sulphate of lime, 2.3 parts ; sulphate of soda, 2.70 ; chloride of sodium, 28.07. It therefore is by no means very unlike Aix-la-Chapelle, having the same quantity of common salt, and perhaps more hydrosulphuric acid, but its waters are cold. Moffatt has maintained its position very well. An old author's account of the action of its waters is as follows :—" It proves mostly an alterant and a diuretic ; it generally opens the belly, and it purges some people." Like other sulphurous waters, it has been much used in cutaneous affections, and in chronic obstructions. Moffatt has much to recommend it.

Strathpeffer, in a narrow valley in a very picturesque country, at the foot of Ben Wyvis in Ross-shire, our most northern spa, has four (two principal) sulphur wells. The pump-room, or new well, according to Dr. M. Thomson's analysis, would seem to contain about 16.5 grains of sulphate

of lime ; 4.2 carbonate of lime ; 9.1 sulphate of magnesia ; 9.3 sulphate of soda ; sulphuretted hydrogen, a fair supply. The upper well contains only half the amount of lime, and about one quarter more of magnesia. They are undoubtedly strong sulphuretted waters.

The usual dose of these waters is three tumblers before breakfast, and three more in the afternoon. Baths can be had, but they are little used in the treatment.

The waters, which appear to be strongly diuretic and usually slightly constipating, are believed to be very efficacious in rheumatism and in dyspepsia, and in cutaneous affections. They are greatly frequented by the people of the country, who come from long distances and drink the water in enormous quantities, but the arrangements are not very perfect, and living is by no means cheap. However, there is a large resort, the clerical element predominating, to these wells, which are very celebrated in the north of Scotland, and it would no doubt be increased if a higher style of accommodation were given ; and this has partially followed the completion of the new railway to the Isle of Skye.

Although there are many sulphur springs in Ireland, only one of them is at present of sufficient importance to require a notice here.

Lisdunvarna, sixteen miles from the nearest railway station in the county Clare, is at present the most popular spa in Ireland. It is situated in an open, uninteresting country, although magnificent rock scenery is within reach of a drive.

Lisdunvarna has sulphur wells containing a fair supply of sulphuretted hydrogen, and chalybeates containing perhaps .4 grains of iron: the two may be seen very prettily associated near the banks of the river, where two little cavities have been excavated side by side, giving forth the sulphur and the chalybeate water respectively.

There is a pump-room for the chief sulphur well, but unfortunately, in heavy rains, which are frequent in this part of the world, the well gets infiltrated by bog-water. Notwithstanding that the arrangements for strangers are very imperfect, the place is usually crowded, and chronic gout and rheumatism, dyspepsia, skin affections, various forms of chlorosis and of anæmia, have all found relief here.

CHAPTER IV.

SALT WATERS.

THE common salt, or chloride of sodium waters, form a tolerably natural group, and one might have supposed that by this time the precise action of so ordinary a substance as culinary salt on the human system might have been accurately ascertained; but our knowledge of the subject still remains very general.

It is not surprising that chloride of sodium is abundant in the human body, as it is a constituent of almost all our food and drink. It has been calculated that a full-grown man may have from 800 to 1,800 grains of salt in his system, and the daily supply taken in has been reckoned at from 90 to 300 grains. Salt forms from 40 to 45 in 10,000 parts of blood; it is a constituent of most of the secretions, of watery transudations in disease, as in cholera, and accompanies the secretion of urea. In drinking salt waters a patient is very unlikely to take in more than 60 to 90 grains of salt daily in excess of his usual supply of that substance.

Its physiological effects have been thus described: first, introduced into the stomach and added to the food, it, as a

solvent, extracts from them their albumen and starch ; next, it helps to pass on to the bowels a soft mass well supplied with these substances ; thirdly, it furnishes a sufficient supply of itself to the blood for the purposes of absorption, secretion, and change of tissue, without permanently overloading the blood, as its excess is quickly excreted again. Salt has a very distinct action on the kidneys, and some have made out a direct proportion between the amount of urea excreted and the quantity of salt taken.

An increased use of salt may be considered to augment temporarily the amount of salt in the blood and in the secretions, probably also the quantity of the blood-corpuscles. The secretions become more abundant, change of tissue is accelerated, the action of the alimentary canal and of the generative organs is slightly stimulated ; no direct action on the nervous system has been observed.

When taken in too large doses, it absorbs water from the mucous surface of the stomach, and excites thirst ; when more salt is offered to the system than the normal state of the blood requires, it is rejected, and causes purging : it may even cause congestion and inflammation of the alimentary canal and kidneys (possibly of the brain), of the conjunctiva, and the nasal passages. On the whole salt may, in a general way, be said to have the power of rousing the vital functions.

Therapeutically, salt acts through the capillaries on the stomach, increasing the secretion of the mucous follicles, augmenting the appetite ; it also exerts a similar influence on the bronchial surfaces and on the mucous membranes generally. It stimulates the liver as a cholagogue, and promotes

a healthier activity of its functions ; as an aperient, which it always is when taken in considerable doses, it is useful in obstructions of the circulation of the portal system. It also favours absorption, undoubtedly often removing fat when it is excessive, and glandular infiltrations, also exudations consequent on acute attacks.¹

The chief salts that are associated with salt waters are chloride of magnesia and chloride and carbonate of lime. Of the action of the former much is not known, but it has been considered a cholagogue. The general action of the lime salts has been alluded to in the chapter on Earthy Waters.

In considering the therapeutic action of salt, we may remember what an important article it is in the food of the ruminants, and that experiments on them would show that salt has a direct effect in increasing the quantity of the corpuscles, and in diminishing that of the water of the blood.

Salt waters require to be drunk with care, as their protracted use is debilitating. When used too long and in too great quantity, they may produce loss of appetite, giddiness, drowsiness, biliary derangement, diarrhoea, and irritative fever. Those waters which contain most carbonic acid are pleasantest, and most easily borne by the stomach ; but especial care is needed in their employment in the case of those who are full-blooded.

¹ I am only aware of a few applications of common salt in ordinary medicine : as a vermifuge, in which it has often seemed to me to be a very useful adjunct to the bark of the pomegranate root ; as a febrifuge it has been used a good deal by the French and the Americans. Salt as a domestic remedy is useful as an emetic, and as an addition to enemas.

Salt waters are probably more useful in improving certain states of system, than in acting specifically on structural changes of particular organs. First in the list of these states comes *scrofula*; but more will be said of it afterwards in connection with salt and sea baths.

There are two forms of *anæmia* which benefit much by salt waters,—that of women, and tropical anæmia. In such cases the question has always to be decided, whether the case is to be treated at once with iron—whether it is better to present iron directly to the system, or to endeavour to get the system into such a state that it may be able to assimilate the iron presented to it in the various articles of food. It may often be best—as the German popular rhyme says,

“ Salt and bread
Make cheeks red ”—

to begin with salt waters, especially in small doses, when there is irritability of the alimentary canal, or congested state of the liver. Practically I have often been disappointed in the use of iron in such cases. Some recent researches point towards the settlement of these questions. It has been found that chloride of sodium does not, like chloride of potass, cause a copious elimination of iron in the urine; on the contrary, it appears greatly to favour the assimilation of that metal. It had been shown formerly that iron, when given internally, is not absorbed of itself, without the favouring agency of chloride of sodium. The great desideratum, therefore, would be a well containing iron and salt in such proportions as to make them readily absorbed, and without

that predominance of salt which makes the use of any considerable quantity of such waters cause purgation ; but no well exactly of this character has been yet discovered. The Luisen well at Homburg, and those at Kronthal, are an approach towards it. Chlorotic anæmia will be afterwards alluded to. Here a few words about the tropical form may not be out of place.

By *Indian cachexy*—and the French have described a similar state in Algiers—is meant the result of longer or shorter exposure to heat, moisture, and malaria ; I mean the general condition induced, whether by general atmospheric influences and long residence, or by repeated attacks of fever, liver, or dysentery. Even after the chronic diarrhœa, so often an obstinate adjunct of this state, has been got over, there remains very generally with torpor of the liver, perhaps along with that odd symptom burning of the feet and hands, a general relaxation of the system, manifested in a great liability to catarrhal attacks, with frequent elongation of the uvula, sometimes along with chronic pharyngitis, and often in women with leucorrhœa. There is a general want of red blood, and deficiency of fibrin manifested, as I have known, by troublesome hæmorrhage after trifling operations, such as snipping off the uvula or the extraction of teeth. From this latter cause I have more than once seen very serious effects follow. In such conditions, where it must always be a matter of time, recovery may be materially assisted by a visit to many of the salt springs ; in short, when the symptoms of general cachexy predominate over local affections.

Dyspepsia is very often benefited by the use of salt waters

Here the choice lies very much between salt and alkaline waters, unless a very free action of the bowels is required, when some of the more purging waters are indicated. In *chronic diarrhœa* there is some evidence that these waters are of use when given in small doses. *Liver* and *spleen* are said both to diminish under the use of these waters. I have no doubt that they do ; but for the former, alkaline or purgative waters are more adapted, and for the latter, purgative or steel ones. Cases are reported of spleen cures with salt water, and, considering the analogy of the action of chlorides with that of iodides and bromides, there is nothing improbable in this ; salt waters are undoubtedly more efficacious than alkaline in such cases, but there seems to be no sufficient evidence of any direct action on that organ, and in spleen I should have more confidence in the usual medical treatment than in mineral waters.

Salt waters are extremely useful in a great variety of *female complaints* depending on general relaxation of the system in older, and on imperfect development in younger patients. A great deal of unnecessary local treatment is often saved by a visit to a salt spring, especially when the patients are once got to believe that local medication is not essential, and I venture to say that one-half of it might be omitted with advantage. No doubt chronic congestions and hypertrophy of the uterus are frequently removed, and its functions restored, by the internal use of salt waters judiciously employed.

Some congestive states of the *eyes*, such as choroiditis or inflammation of the ciliary body, occurring chiefly in women,

and connected with feeble circulation, and not amenable to ordinary treatment, are often greatly benefited by alterative waters like those of Kissingen and Homburg, or steel ones like Schwalbach. Many baths have wells that have got the name of eye wells. I need hardly say that there can be no specific action in such cases, any more than in cases of *deafness*, which may benefit by the favourable operation of such waters on the general health.

Patients going to the most popular baths in Europe, such as Homburg and Kissingen, or to Harrogate in this country, are seldom aware that the chief constituent of the waters they drink is common salt.

It is the generally received doctrine in Germany, that salt springs containing from about 40 to 50 grains of salt to the pint, are the most suited for general use; and waters containing more than 80 grains to the pint are diluted.

But the internal use of salt waters is very generally accompanied by the *external application* of them. In parts of the Continent far removed from the sea, the salt springs are in great repute, and *sool bäder*, as they are called, are extensively used. They are of less importance to the French and English, who have a large supply of sea-coast watering-places, where by proper arrangements every effect produced by the salt springs might be obtained.

The stronger ones are most of them artificially prepared; that is, a weak spring is strengthened by adding the salt *Mutter-Länge*, as they call it, and too strong a one is diluted. Their efficacy depends on the stimulation of the skin, and the degree of this depends on the strength of the bath, on

the length of the immersion, and much also on the skin of the patient. The sensibility of the skin depends partly on age, and partly on individual constitution : 2 to 3 per cent. is the average for most people (ordinary sea-water is perhaps a little stronger than this), while 10 per cent. of salt in the bath may produce over-stimulation of the skin ; an advantage which these waters possess over indifferent thermal ones is, that with a lower temperature they produce as much stimulation of the skin.

It is tolerably certain, that no portion of the salt is absorbed during immersion, although it is a matter of ordinary experience that a certain amount of it adheres to the cuticle. Some of these springs owe most of their reputation to the supposed absorption of the iodine or bromine which they contain ; but even if a part of the minute quantities held in solution were absorbed, their amount is so small that they could not be reasonably supposed to act on the organism. Salt baths are believed to act primarily on the skin, and to favour the transformation of tissue. During their use the appetite, powers of digestion, and general vigour increase ; and experiments would seem to show, that an increased secretion of urea is a result of this quickened oxidation.

Scrofula has long been considered specially under the influence of sea-air and of salt waters, and of their use in it there is no question, though their action is greatly helped by the internal employment of ordinary medicines to assist in the resolution of swollen glands.

It is probably owing to the favourable influence which they exert on anæmic conditions, that salt baths are in great

repute in many of the *sexual diseases* of women, chiefly in those depending on debility; they are said to disperse indurations of the uterus and of the ovaries; nay, there are not wanting accounts of fibroid tumours of the uterus, and even of cancer of the breasts, being cured at Ischl and at Kreuznach: but such statements must be received with caution. Fibroid occasionally disappears of itself.

There is no question that salt baths are often extremely efficacious in debility the result of acute illness, in protracted convalescence, and in improving the general tone of the nervous system. They are useful when it is desired to increase the activity of the cutaneous circulation and change of tissue, and it is in this way no doubt that they are useful in *chronic rheumatism* and in *gout*. Much in such cases depends on the temperature of the baths used: where the temperature is high, some of the weaker saline baths, such as Wiesbaden and Baden-Baden, are among the more efficacious ones for gout. But it must be considered, that their qualities in this respect are mainly the same as those of the indifferent baths, especially in the case of Baden-Baden, where the quantity of salt is so small. It is no doubt owing to their high temperature, that the baths of Bourbonne, like indifferent springs, have got a reputation in *paralysis* and *old wounds*.

The following tables show the quantity of solid ingredients, of common salt, and of carbonic acid in some of the principal springs, also their temperature.

COLD SALT SPRINGS.

	SALT.	MINERAL CONTENTS.	CARBONIC ACID.
Kronthal	29	38.3	36
Niederbronn	30.8	46.2 . . . . .	.. . . . .
Kissingen, R.	61.0	85.2	31.9
Pyrmont, S.	70.4	89.7	18
Kreuznach, E.	95.5	122.2 . . . . .	.. . . . .
Homburg, E.	102	132.9	26.3
Dürkheim	102.7	129.6 . . . . .	.. . . . .
Soden, S.	148.9	166.1	16.7
Woodhall Spa	214	279 . . . . .	.. . . . .
German Ocean	285.8	371 . . . . .	.. . . . .

THERMAL SALT SPRINGS.

	TEMPERATURE.	SALT.	MINERAL CONTENTS.	CARBONIC ACID.
Pozzuoli	113°—86°	6.2	9 . . . . .	.. . . . .
Liebenzell	77—73	6.6	10.2 . . . . .	.. . . . .
Luxeuil	123—77	7.7	11.6 . . . . .	.. . . . .
Bourbon Lancy	132—82	13	22.7 . . . . .	.. . . . .
Canstadt, S.	75	20	48.5	18.2
Bourbon, A.	125.6	22.4	43.5 . . . . .	.. . . . .
Baden-Baden, U.	155	23.1	27.2 . . . . .	.. . . . .
Soden, M.	75	25.6	34.5	18.8
Bourbonne	149	57.7	74.7 . . . . .	.. . . . .
Balaruc	116.6	68	90.8 . . . . .	.. . . . .
Wiesbaden, K.	156	69.8	82	10.3
Münster am Stein, H.	86	71.5	87.5 . . . . .	.. . . . .
La Porretta	95	83.4	90 . . . . .	.. . . . .
Nauheim, K. S.	103—80	165.4	235	16.9
Monte Catini	88—81.5	180.8	231.3 . . . . .	.. . . . .
Rehme, J. S.	92	312	404.8	11.8

Perhaps the most convenient way of classifying salt springs for practical purposes is into—1, those which are chiefly employed for drinking; 2, those generally employed both for drinking and bathing.; 3, those chiefly employed for bathing.

(1.) The first class are chiefly wells containing a libera supply of carbonic acid.

Kissingen, in the pleasant valley of the Saal in North Bavaria, has at last been reached by a railway from Schweinfurth. Its climate is mild, but the air is apt to feel close. It has long been one of the most favourite of modern watering-places, and a great resort of the English; the writings of that patriarch of English Balneology, the late Dr. Granville, having contributed greatly to this.

The *Rakotzky* is one of the milder salt springs, with a plentiful supply of carbonic acid, and a quite appreciable quantity of iron. The *Pandur* agrees closely with it. A milder spring, the *Maxbrunnen*, is a delicious table drink; the *Sool-bad*, about a mile off, with its *wellenbad* (supplied from that magnificent well, the great Sprudel, with its intermittent flow, and immense supply of carbonic acid), is invigorating; there is a strong bitter or purging well, and only four miles off is Bocklet with its strong chalybeate spring. The arrangements of all kinds are excellent. The waters of the Sprudel have lately been brought into the station to supply the new baths, which afford every convenience. There is a handsome *Kursaal*; there are good hotels and lodgings, and pleasant excursions to be made in the neighbourhood. There is not so much dress or folly here as at Homburg, nor are the *tables d'hôte* so good. The English often complain unreasonably of its being dull.

The waters were to me more palatable than those of Homburg, being less salt. The general indications for the use of waters of this sort have been already given. They are chiefly in repute in affections of the stomach and in dyspepsia. They are useful in disturbances of nutrition

and of the abdominal circulation, under which come a great many uterine and liver affections. They are of use in altering gouty rheumatic and anæmic conditions, and are often employed with success in various nervous affections, such as hysteria and hypochondriasis. The character of the class of patients that frequent Kissingen may be gathered from an analysis of the cases treated there for twelve years : 42 per cent. suffered from affections of the digestive organs, 18 per cent. from nervous affections, and 8 per cent. from the diseases of women. As salt is manufactured at Kissingen, the stronger salt baths can be produced. The action of the water is milder than that of the Homburg ones. The water is drawn up on sticks from the well, but the arrangement of open wells, with girls to hand up the water, is pleasanter.

Homburg is reached by railway, and, being near Frankfort, is very centrally situated. There are excellent hotels, and not expensive lodgings. Everything has been done to make it attractive to strangers ; the magnificent reading and ball rooms are open to all ; the grounds are extensive and beautifully laid out ; the wells are abundant and various ; so that it is not surprising that the place has attained a wonderful degree of popularity. Its wells may, on the whole, be described as a more powerful Kissingen ; and the place being more open, and standing higher, on the slope of a hill, makes the heat not feel so oppressive as in Kissingen. At this moment Homburg is the most popular bath in Europe.

French, English, and Americans quite outnumber the

Germans. Here comes the fine lady to recruit from the dissipation of the last season; the *bon-vivant* to repair his digestion after the good things he has been indulging in; the clergyman, or the man of business, for relaxation. You have leading statesmen and capitalists meeting all the blacklegs of Europe. Still, such mixtures have been found at all popular spas in all ages, and there is an immense deal of benefit to be got from the waters by those who are in earnest in using them.

An analysis of the *Elizabethbrunnen* is given in the table; the *Kaiser* has only 74 grains of salt, and as much iron; the *Ludwig*, about 50 grains, and no iron; the *Luisen*, about 30 grains of salt, and .48 of iron; there is also the *Stahlbrunnen*, with its large supply of iron. The waters are mainly drunk, and three glasses of the Elizabethbrunnen have generally a very distinct aperient effect. With reference to the class of patients likely to benefit by Homburg waters, most of what has been said of Kissingen applies to them. Dyspepsia, gastralgia, and constipation are often relieved; so also slight degrees of liver congestion and of enlargement of spleen. The careful employment of small doses of the water may be useful in diarrhœa. The active use of the waters is successful in abdominal congestions and in restoring the hæmorrhoidal discharge; it sometimes reduces obesity; but on the whole perhaps no cases improve so much as those of anæmia and chlorosis, and the Luisenbrunnen is often conveniently made supplemental to the other waters in such cases. Owing to the variety of the wells, there is great facility in graduating

the amount of salt or of iron to be taken. Baths of all kinds are supplied here; but Homburg is not a place to go to for bathing, although the new baths with their waters heated by steam promise to be very popular. The carbonic gas inhalation-rooms are not much used.

Pyrmont, known better for its iron springs and having strong salt baths, has a pleasant salt well with a moderate amount of salt and plenty of carbonic acid gas.

Soden, at the foot of the southern slope of the Taunus mountains, is cheerful, and nicely laid out. It makes a convenient change from Homburg. The climate, like that of Wiesbaden, is counted mild, and is classed among sedative ones, and in consequence Germans recommend the place in threatened phthisis. Some of its wells contain from .240 to .36 grains of iron. They are lukewarm springs with plenty of carbonic acid. They are most of them somewhat too strong or somewhat too weak. There is rather a want of springs of intermediate strength. There is a good iron spring within twenty minutes' walk. An excellent new bathing establishment has been recently opened.

A number of the maladies treated at Homburg and Kissingen may find relief here. The speciality of Soden seems to be in the amount of attention paid to pulmonary cases; it is adapted for chronic bronchitis and affections of the larynx. This quiet comfortable place deserves more notice than it has hitherto received from the English.

Kronthal, half an hour's walk from Soden, and prettily situated a little higher, and with a small establishment, makes another pleasant change from Homburg. Its waters are

very mild, the strongest well having only 33 grains of common salt. The waters are delicious to drink.

Canstadt, adjoining Stuttgart, has its lukewarm wells and baths at the foot of a low hill laid out in gardens, and having beautiful views up the valley of Stuttgart. The winter climate is mild, and its air is said to be remarkably still. The waters, which are very abundant, offer a moderately strong supply of salt, with a small one of iron. They have considerable and growing repute in dyspepsia and other affections not requiring more active waters. It has large and handsome establishments. There are many English resident in Stuttgart for educational and other purposes, and they might make more use of these waters than they do.

Niederbronn, in a very picturesque country, lately transferred to Germany, offers weak cold salt springs. They have long been very popular in the district; but they have no remarkable characteristics. They are most employed internally in affections of the digestive and abdominal organs.

Bridge of Allan, near Stirling.—The sheltered situation of this place makes it a favourite resort for the people of Edinburgh and for others, who are glad to escape for a time the cold wind of the eastern coast. It has a salt spring, which contains 59 grains of common salt, 47.3 of muriate, and 5.1 of sulphate of lime; unfortunately the presence of nearly as much lime as of salt impedes the favourable action of the former. Nevertheless these waters are a good deal resorted to for affections of the digestive organs—certain forms of which are commonly supposed to be induced by whisky drinking and the use of oatmeal. The waters are

aperient, and they are heated before they are drunk. Three tumblers before breakfast is the usual quantity.

Bridge of Allan is a very pleasant health-resort, as are also the smaller places of *Pitcaithly* and *Innerleithen*, both having waters of the same nature with it, containing a good deal of common salt, along with muriate and lime.

There are various English salt springs much less loaded with lime, and whose waters are therefore preferable to the Scotch ones. But they are so little visited, that I can only enumerate the names of some in a work like this. They are :—*Thorp Arch* in Yorkshire, *Admaston* in Shropshire, and *Builth* in Wales.

(2.) We come next to the waters usually employed both in bathing and drinking.

Wiesbaden, one of the most important thermal baths of Europe, visited by 15,000 to 20,000 guests annually, is the capital of Nassau, and lies in a valley only open to the south ; it is easily reached from all quarters by railway. The climate is not an extreme one, and in winter is mild for Germany, and many foreign families are beginning to make it their winter residence. Like almost all continental baths, it is for a time in summer intensely hot. The water is very abundant, and almost all the hotels have baths in them, or in their close proximity. There are no fewer than seventeen sources of warm water. Only one of the wells, the Kochbrunnen, is used for drinking. The waters contain from 45 to 58 grains of common salt in 16 oz. The hottest of them has a temperature of 156°. The waters when drunk are well suited for cases where a moderate action of chloride of

sodium is desired. They are applicable in some forms of indigestion, in atonic gout, in enlarged liver, and even in spleen. The warmth of these waters, and their small supply of carbonic acid, often make them more soothing in irritable conditions of the stomach, than more stimulating cold waters. They are also often better borne in chronic diarrhœa.

The general effects of the waters of Wiesbaden used in baths, are pretty much the same as those of indifferent waters, and many of the cases that are sent to Teplitz might be very well treated here. The douches and local treatment are not as complete as in Teplitz, Wildbad, the two Aixs, but improvement is promised, at the *Rosenbad* at least. Wiesbaden has a great reputation for gout, as Aix-la-Chapelle has for rheumatism. It is provided with very pleasant gardens, a handsome *Kursaal*, and Conversation House, so that it offers inducements to people of all tastes. The town is not striking, nor is its neighbourhood, but it is a very comfortable place of residence, in which one can live cheaply or expensively, according as he manages; and its convenient situation near Mayence and Frankfort will always make it a great place of resort.

Baden-Baden, far the most picturesque and pleasant bath in Europe, is easily reached by railway through Strasburg. It has no fewer than thirteen wells, varying in temperature from 115° to 144°. Their mineralization is not high; they are little used for drinking; still most of the advantages of an indifferent bath may be had here. Chronic rheumatism and gouty cases, that would not bear more active treatment, are often sent to it with advantage.

It remains to be determined, whether the unusual amount of lithia in the *Mur* well here is of any real importance in gout. Its 3.8 grains of lithia are accompanied by 27.5 grains of other salts.

All the establishments of Baden are on a magnificent scale; and in anticipation of the closing of the tables, new and very complete baths have been erected, including vapour and swimming baths.

The climate is warm, comparatively so even in winter; and there is abundance of amusement to be had, so that persons merely requiring relaxation and change of air, without having anything specially wrong with them, cannot be sent to a better place. Everyone likes Baden, but few go to it for treatment. Some English spend the winter there.

Liebenzell, 995 feet high, a small quiet spot within about eight miles of Wildbad, possesses mild thermal baths, having much the same qualities as those of that place, although it contains a few grains of common salt and a little iron and carbonic acid. As the temperature of none of its wells exceeds 77° , it has to be raised for bathing. It is a place for those who want rest and quiet, and who find Wildbad too crowded. It is popular with German ladies.

Bourbonne les Bains, in the Haute Marne, is one of the chief French salt waters. It is a small town, agreeably situated outside the Vosges mountains. Its waters contain about as much salt as those of Wiesbaden, with a good deal of nitrogen and of carbonic acid gas. Its waters are quite sufficiently warm (temperature 114° to 147°); and as the two places fulfil very much the same indications, it has some-

times been called the French Wiesbaden. In both places the bathing is generally associated with drinking the waters ; but Bourbonne must have improved greatly, if it be nearly as pleasant a place of residence as its German compeer, although I believe it to be comfortable, and not expensive. There is a military hospital here, and it is worth while to remark, that the baths have been found efficacious in rebellious malarious fevers, and in the visceral engorgements of the abdomen, which occur in soldiers who have served in Africa. Champouillon says nothing of this, but that it is good for chronic articular rheumatism, if not old, and in slighter sciaticas.

Bourbon l'Archambault, reached *viâ* Moulins, with weaker salt waters, and with a military hospital, was formerly in great repute. It is still much frequented by people of the country ; but it is a dull place, and the accommodation is very rough. The curious practice of performing scarification, after exhausting the air by suction through a horn, used to be employed here. A new bathing establishment and corresponding measures might restore the really deserved reputation of these waters. The treatment is mainly active thermal. There are two chalybeate springs.

Balaruc, situated on the edge of a salt lake, the borders of which are enlivened by neat villages, near the thriving town of Cette, has salt waters of nearly double the strength of those of Bourbonne, with a temperature of 118° , which have been well known for some centuries. Its waters have obtained a somewhat doubtful reputation in paralysis by the very active application of thermal treatment, including vapour baths, douches, and mud impregnated with salt.

The waters are also drunk. The climate of the place is mild, and treatment may very well be carried on in winter. Balaruc is not much resorted to by strangers, and I believe living there to be expensive and not very comfortable.

Two other more feebly mineralized waters deserve mention, as they were both used by the Romans, and both afford an ample supply of warm waters:—

Bourbon Lancy, seven miles from the railway, once the resort of royalty, now neglected, notwithstanding its large establishment with its vast swimming bath, which is falling into decay. It is at some distance from Moulins.

Luxeuil, in a pleasant country in the Vosges. Its ancient thermæ were on a grand scale, and it has now a handsome establishment. The waters contain a little manganese, iron, and arsenic.

Both these waters are found most useful in rheumatisms and neuralgias, especially when the latter are associated with chlorotic or anæmic conditions.

Ischia, an hour and a half by steam from Naples, at the northern corner of the bay; whether this island be an epitome of the universe, as it was called by Bishop Berkeley, or not, it is probably the most interesting bath in the world. The variety of its sources, and their abundance both in caloric and in mineral constituents, the beauty of its scenery, its delicious climate, and its historical associations, distinguish it from all others. It combines the advantages of sea-air and sea-bathing with those that are special to its wells, and almost its only drawback is its insular position. Plenty of accommodation can be had. There are excellent

lodgings on the hills above the village of Casa Micciola, where the air is much cooler than down below, and bracing as compared with the air of other Italian places in summer. A good many English resort to Ischia.

There are fourteen sources in the island, varying from 72° to 170° in temperature; one is believed to come up to 212° , and one rises in the sea. They are essentially salt springs, with an unusual quantity of carbonate of soda, and with a greater or smaller amount of the purging sulphate of soda, with a considerable quantity of carbonic acid. I have not seen the latest analysis of these waters, but some of them have been stated thus:—Capponi, common salt, 39.8; carbonate of soda, 6.3; sulphate of soda, 3.5 parts. Gurgitello has been stated at: common salt, 30.5; carbonate of soda, 28.1 parts. Citara: salt, 48.5; carbonate of soda, 2.3; sulphate of soda, 3.8.

The *Bagno Fresco* is believed to have the virtues of Schlangenbad, for the skin.

Gurgitello is used almost entirely in baths. This is the water most employed and best known to strangers.

Capponi, having the chicken-broth smell of some waters, is more drunk, is slightly aperient, and used chiefly for the digestion.

Citara, beautifully situated, has long had the same virtues attributed to it, as the *Buben Quelle* at Ems. It contains much salt, and is used chiefly in baths; taken internally, it is very purgative.

Acqua di Sta. Restituta is the strongest in chloride of sodium.

Olmitello has a reputation in calculous disorders.

There are natural vapour baths at *Castiglione* and at *Cacciuto*, at *San Lorenzo*, and elsewhere, and the process of arenation is carried on here.

It is evident that a great range of diseases may be appropriately treated at Ischia. In rheumatism, and in all diseases requiring active thermal treatment, these baths, with proper precautions, may be used with great advantage. There are two public bathing establishments, and the Hospital de la Misericordia; also two private *Casi di Salute*. The regular season is from May 1st to September 30th, and the cure is supposed to last for thirty days. The baths of Ischia are capable of much further development.

Castellamare, near Naples, formerly *Stabiæ*, contains a number of salt springs known to the ancients. They vary in strength, but their main constituent is common salt, in quantities from 17 to 46 parts, with carbonate of soda from 2.4 to 9.1, and sulphate of soda 3 to 6 parts, and iron in one case .26. On the spot the wells are considered to vary very considerably in their effects, and different wells are prescribed according to the nature of the malady; rheumatism, gout, obesity, cutaneous affections, being of the number, while affections of the digestive organs are the chief ones treated. A new spring has appeared here since the late eruption of Vesuvius.

Pozzuoli.—The use of the old thermal waters of Puteoli at the Temple of Serapis has been revived of late years, and they are in considerable repute at Naples. They are five in number. In the neighbouring *Solfaterra* there is a hot

spring containing sulphuric acid ; it is used as an external application. The temperature of the hot spring is about 96°. These waters are weak salt ones, but they contain a good deal of soda, and one of them should be valuable in dyspepsia, according to its analysis, which gives it : salt, 24 parts ; carbonate of soda, 10.4 parts ; and a little iron. They are chiefly used for baths.

Here we are in the very cradle of Western bathing and luxury, in the vicinity of Baia. Of this interesting district I can only say, that an attempt is being made to convert the *Villa Cardito* into a bathing establishment, and that some old thermal springs and a large piscina have been opened out. The malaria is the great obstacle to the restoration of the baths in this neighbourhood.

La Porretta, lying between Pistoja and Bologna, is three hours by rail from Florence, in the valley of the Reno, at the mouth of a gorge of the Apennines, and at a height of 1,100 feet ; it has thermal springs of a temperature from 85° to 100°, the main constituent of which is common salt—in the stronger wells reaching to as much as 83.4 parts—containing a little sulphuretted hydrogen, and so much carburetted hydrogen, that it has at times been collected for the purpose of lighting the little town.

There is much variety in the strength of the waters, and they may be applied in consequence to the treatment of a great variety of affections. But their special reputation is in the treatment of cutaneous diseases, no doubt owing to the small quantity of hydrosulphuric acid they contain. Besides being drunk, the waters are also employed in

baths and douches, and they may be used at their natural temperature.

The arrangements of the place are fair, indeed some of the baths are fitted up very handsomely with marble, but it is scarcely visited by the English, though with management they may do very well. Of late years there have been nearly 700 visitors. There is a casino close to the spring where people may lodge, and there are two tolerable inns in the village.

Monte Catini, between Lucca and Pistoja, in the valley of the Nievole, on the railway, is a pretty enough place, and the most important salt bath in Italy. The waters rise in great abundance, and of various strengths. The arrangements are on a handsome scale, and in former times the Dukes of Tuscany visited it annually, and were its great patrons. There are hotels and lodging-houses. The strongest spring, the *Terma Leopoldina*, of about the temperature of 93° , contains 185 parts of common salt; a milder one, the *Tettuccio*, contains 46 parts of salt—it contains a little carbonic acid gas, and is of the temperature of 80° to 81° . Like other salt springs, these have been lauded for containing iodine.

The stronger spring is used for bathing; the weaker one, for drinking. The dose is somewhat large—four or five pints a day. Of late years a stronger aperient spring has been discovered. The waters are largely exported.

The Italian doctors consider these waters sovereign remedies against dysentery and ague, and enlargement of the liver and spleen. Constantine James even classes them

with Karlsbad in hypertrophies of the liver; but there appears to be nothing in the chemical constitution of the waters, to make us expect any other results than those obtained at Homburg and Kissingen, and the absence of carbonic acid makes them much less pleasant to drink. However, it is very remarkable, how for centuries these waters have been praised in dysentery and in the consequences of inflammation of the bowels.

The grotto of *Monsumanno*, four miles distant, is much used as a *stufa* or hot-air bath. The grotto is dark, and as you pass on, you get gradually hotter and hotter till you reach the *inferno*, by which time you are bathed in the most copious perspiration; it is very useful in rheumatism, but much care is required to avoid chills after the process. The arrangements are somewhat rough; people go in bathing clothes, which get saturated with moisture, after which the patients are packed in blankets and sent home. A good many English go to Monte Catini.

Cestona.—The thermal salt waters of this place have obtained considerable popularity. Of a temperature of 88° to 94°, they seem to contain chiefly common salt, 57 parts, with one-third as much sulphate of lime, and about one-ninth of sulphate of soda. They are very distinctly purgative. The waters are used for drinking, for baths, and douches. They are used in rheumatism, disorders of the digestion, and in bronchitic affections.

There are good hotels, and the neighbouring country in the north of Spain is beautiful. It is one of the group of

Spanish baths within easy reach of San Sebastian, which comprise sulphurous, iron, carbonated, earthy, and chloride of sodium waters. The establishment itself looks rather gloomy.

The baths of *Trillo*, not very far from Madrid, and high up the Tagus, are among the most popular spas in Spain. The temperature of the water is only from 73° to 86° , and the amount of common salt or of other solid constituents is very small. However, it is lauded in rheumatism, paralysis, secondary syphilis, and diseased joints. The neighbourhood seems pleasant, and the walks are varied. The water is also drunk.

Caldas de Montbuy.—These springs, which are only four leagues from Barcelona, have a temperature of 153° to 158° , and contain a large quantity of salt. They are in great repute for rheumatism, sciatica, and old wounds. They have an early season—from 1st of May to 15th of July, and after the extreme heat is over, from 1st of September to 15th of October.

(3.) Our next class is that of waters more used for bathing than for drinking. This includes all the strongest natural mineral springs: such as Reichenhall, having in 10,000 parts, 2,260 of chlorides; Hall on the Inn, 2,547; Salies in Bearne, 2,334; Droitwich, about the same as the last. The strength of these springs is rivalled by various concentrated waters or *Mutter-Läuges*, of which Dürkheim contains 4,000. But the mere strength of a well is comparatively unimportant, as the stronger ones have to be diluted for use, and the weaker ones have to be strengthened.

Of this class of baths it may be said that they produce the greatest stimulation of the skin, and in the highest degree the effects ascribed to salt baths in the commencement of the chapter. While the strength of the weaker baths varied from .24 to 1.3 per cent., and while the carbonated baths to be presently mentioned vary from 2 to 3 per cent., these stronger ones vary from $2\frac{1}{2}$ to 5 per cent., and may even rise to 10 per cent., or more.

The water of salt springs or of the concentrated liquor is often drunk diluted with water or with milk or whey.

Kreuznach, in the valley of the Nahe, less than an hour by railway from Bingen on the Rhine, is a pleasant enough place, with a mild climate, and situated very conveniently for those who are not German, on the borders of France. Its strong salt bath was the first in Europe which was found efficacious in scrofula and strumous swellings, and all the other salt springs have come into use, more or less in imitation of it.

In this place more scrofulous patients are usually to be seen, than at any other source. Scrofula has been so long systematically treated here, that the physicians have great experience in it. The cures attributed to iodine, here and elsewhere, the stories one so commonly hears, of fibroid and other tumours of the uterus or of its appendages being removed by Kreuznach waters, even after courses of three or four seasons, must not too readily be believed. Yet that great general amendment of health, and the removal of old uterine congestions, are often effected, is beyond all question. The salt spring (the *Elisen* is the one usually drunk) has a

material share in the cures. The baths are taken about an hour after drinking, and commonly of the temperature of 90° to 92° ; patients usually begin with baths lasting for a quarter of an hour, and the time is gradually increased up to three-quarters of an hour; wet applications and douches are much used. The principal wells and baths and the *Kursaal* are in a wooded island in the Nahe, and pleasant excursions can be made in the neighbourhood. The arrangements of the baths, that I saw, rather disappointed me, considering the high reputation of the place; living is comfortable and not expensive; there is a sufficiency of amusement. It is generally crowded with English, and many French went there before the war.

Münster am Stein, close to Kreuznach, recommends itself by its more picturesque situation, and by the temperature of its springs, which is higher and nearly the same as that of Rehme and Nauheim.

Ischl, in the Salzburg district, in the valley of the Traun—nearest railway station, Gmunden; will be reached this year by the railway—is 1,440 feet above the sea, and is situated amidst glorious scenery. Besides strong salt and pine baths, it offers a hydropathic establishment to the invalid. It has got the character of being soothing in lung affections of the erethic type: it has mud or peat baths, two weak sulphur wells, and it is a great place for the whey cure. It is often visited by emperors, and is a crowded place in the season. There are no indications for the use of its baths, in any way special to the place. The waters drunk are chiefly the imported ones of other springs.

Aussee, not far from Ischl, at a height of 2,100 feet, in the midst of beautiful scenery, presents the same advantages as to salt baths, and is quiet and much less expensive. It has also a whey cure. Dr. Schreiber's new sanatorium and hydropathic establishment is admirably managed.

Reichenhall is very similar. It is in the same district, and is reached by a branch of the Munich and Salzburg railway. It is in the centre of as beautiful scenery as Ischl, and offers the attractions of an inhaling chamber, a compressed air apparatus, of mountain bitters, and milk and whey cures. It has risen quickly into notice ; is visited much by the northern Germans, little by the English. It has made rapid progress in the last few years—new hotels and villas have sprung up. One of the unsightly *gradir häuser* has been removed. A new garden and park have been laid out. For the present there is rather a want of shade, as the walks newly made in the pine-forests are at some distance. It is a quieter and cheaper place than Ischl ; not far from some of the most beautiful scenery, from the Königsee, the Watzmann, and some of those curious channels worked in the limestone rocks, called *clamms*, of which Pfeffers may be considered a specimen on a vast scale.

Kreuth has the advantage of being 3,000 feet above the sea ; it is reached by a four hours' drive from Holzkirchen, passing the beautiful Tegernsee. When you arrive there, you find yourself in a meadow of a few acres, surrounded by lofty mountains ; and I know no more complete picture of the idyllic life the Germans are so fond of describing. There are no houses here but those connected with the

Government baths. Besides the salt bath, supplied from the new bath *Rosenheim*, there are two sulphur springs. The whey cure is here in full force. It is a very cheap and quiet place for those who want a moderately Alpine climate, and no very particularly active waters. It is frequented chiefly by Germans, and is usually very crowded, and no doubt would be voted insufferably dull by the English, but might be a very pleasant summer residence for quietly disposed people, notwithstanding that its arrangements are somewhat primitive. There is no salt spring.

Hall, in Austria, three or four hours' drive from Linz, has of late years risen into considerable repute, mainly owing to the character its water has for curing goître. The baths commonly in use are only of moderate strength, containing about $1\frac{1}{2}$ per cent. of salts, and .7 of iodides and bromides. There are good bath arrangements, and some money has been expended in laying out the place.

The number of places where strong salt baths can be procured in Germany is very great. Some I can do little more than enumerate.

Salzungen, in the Wera valley in Saxe Meiningen, on the edge of a lake, is a cheerful place, with good arrangements.

Kösen, in the Saal valley, is popular with the northern Germans.

Pyrmont has a large establishment for salt baths.

So also has *Dürkheim*, in Rhenish Bavaria, a cheap place, much resorted to of late years for its whey, and still more for its grape cures.

Bex, in the valley of the Rhone, amidst beautiful scenery,

but with only the elevation of 1,400 feet, possesses a powerful salt spring, which, now that a very complete bathing establishment has been erected, is well worth the attention of the English who live here in *pensions* at very moderate rates. It is apt to get very hot in summer. Like other places near that end of the Lake of Geneva, it is recommended for delicate lungs, in the early spring, when it is desirable to leave the stations at the head of the lake.

And *Rheinfeld*, near Basle, promises to be useful in the same way as other salt baths.

There are several Italian salt waters besides those already mentioned, but I have no space to particularize them.

The French are rather deficient in strong salt baths, but they have been very anxious, especially since the war, to raise up some rival to Kreuznach and the German *soolen*: and great efforts are being made to bring *Salies* in Bearne, at the foot of the Pyrenees, into notice as a substitute, and there seems to be no reason why they should not succeed. It is still quite a new place.

England has many salt *wiches* or springs, which might readily vie with any continental ones, if they were only utilized.

Droitwich, a rather dull, old-fashioned town, on the railway, seven miles from Worcester, is, I believe, almost the only place in England where thoroughly concentrated baths can be had. Attention has been turned to the place, and there is every prospect of its soon being in possession of a good bathing establishment. The water is so rich in salt, that the treatment pursued at Kreuznach and other places can

be carried out with the greatest facility whenever we have the new baths, and medical men acquire experience in using them. The neighbouring country is pleasant.

Ashby de la Zouch has tolerably strong salt baths, but very much has not been heard of them of late.

Woodhall Spa, near Lincoln, has a salt spring of much the same kind as the last, but weaker. It has a hotel and pleasure ground, a pump-room, and some six bath-rooms. It is very fairly managed, and enjoys a considerable repute, and is found especially useful in old affections of the joints having a rheumatic or gouty origin, and also in scrofula. Its water has one-fourth the quantity of salt in sea-water, with some bromides and iodides, and is exported for drinking.

Before proceeding to examine sea-water, I must say a word or two about a variety of salt baths, a sort of intermediate class of waters.

Salt Baths strongly impregnated with *carbonic acid*.—Something has already been said concerning the action on the system of the carbonic acid present in some baths. This class of baths has come into great favour in Germany of late years; and if their advocates at the two chief seats of these baths—Nauheim and Rehme—are perhaps a little too confident as to the results they have produced, there is no doubt that the presence of a considerable quantity of carbonic acid in a salt bath, while it is most agreeable to the feelings, adds materially to its efficacy.

This form of bath is most applicable as a general stimulant and tonic, when the system is low; for instance, in slow recovery from an illness, or retarded development of

children, and in anæmic cases generally. It is used for the same forms of diseases as other salt baths. But it has been thought to be specially useful in chronic nervous affections, and even in some cases of that most hopeless, yet often long-protracted malady, tabes dorsalis. The colder temperature at which these baths are given, renders them peculiarly suited to cases of hysterical paralysis and other forms of hysteria. These waters can no more than those of Kreuznach heal serious ovarian or uterine diseases ; but they may be of a great deal of use in the functional disorders of the uterus.

Nauheim, with its salt water springs varying from about 83° to 100° in temperature, on the railway between Frankfort and Giessen, and distant a pleasant drive from Homburg, has of late years come into great notice owing to the temperature of its salt water and the large quantity of carbonic acid it contains. The great Sprudel is the most remarkable well of its kind, throwing jets of water about nine feet into the air, and in this respect is only second to Karlsbad, which, owing to the quantity of vapour which it emits, is likely always to remain the most striking of thermal springs.

Everything is new at Nauheim, and the arrangements of all kinds are excellent, from the handsome conversation house with its ball-room and now closed gambling-tables, down to the bathing-houses and inhalation chambers. There are several salt drinking springs, which are, however, in taste not at all attractive, after the pleasanter similar ones of Kissingen or Homburg. There is a great manufacture of salt at Nauheim ; so that there is no difficulty in making the baths as salt as is desirable ; and there is the air of the

gradir häuser, for those who are likely to be benefited by it. The country around is fairly interesting.

The pleasant acidulous spring of *Schwalheim* is near.

Nauheim has hitherto been chiefly visited by the English, who go over from Homburg to spend the day there ; but it is hoped that, now that the gambling-tables are closed at Homburg, a portion of the crowd which frequents that place may be diverted to Nauheim : and undoubtedly all the best effects of salt baths can be obtained at it. Beneke has recently urged the advantages of Nauheim for convalescents from articular rheumatism, whether with or without heart affection. Of course the more recent the case is, the better chance is there of its benefiting.

Rehme Oeynhausen is well worth the notice of the English, both on account of its excellent arrangements, and because it is further north than most of the favourite watering-places, and therefore the extreme heat of many of them is not found there. It lies in Westphalia, not far from the Porta Westphalica, in a pretty valley, environed by tolerably high hills; but open to the west, with a mild climate, and pure moderately damp air. The Cologne and Minden railway passes through Oeynhausen, so that it is easy of access. The thermal baths are counted to be among the finest modern ones, and the great domed inhalation room is the largest of the kind. The temperature of the salt spring, which rises from a depth of 2,219 feet, is 92°. The baths are used in various degrees of concentration. Rehme is rising into some importance as a bath, but is chiefly frequented by northern Germans ; and it is difficult, not-

withstanding the example of Kreuznach, to expect great popularity for it among the English, as the virtues of its salt waters reside mainly in the baths, and as its salt springs are too strong to be well adapted for drinking.

We come next to a very important variety of these baths—to sea-water baths.

The general characteristics of sea-air have been already noticed, and those who go to the sea-side to bathe are necessarily brought under its influence. *Bathing in the sea* differs from bathing in any other saline waters, in the body being in sea-bathing far more exposed to the open air and to the presence of waves, the force of which produces a certain amount of what is called shock to the system. The temperature of sea and air, and the effect of the water, must constantly vary, and the presence or absence of wind makes the effect of a bath of this kind much more variable than that of a bath taken in the house.

Sea-water of the German Ocean holds in solution on an average—common salt, 285 parts; chloride of magnesia, 38 parts; sulphate of lime, 38 parts; sulphate of potash, 8 parts: but the quantity varies, being most in the Mediterranean, and least in the Baltic. Chemists arrange the relative quantities of salts variously.

Sea-water has often been used *internally*: the ancients employed a mixture of it and honey as a purgative, and indeed they used to mix it with some of their wines, thinking that a small quantity, about a thirtieth part of it, improved their quality. In France and in England it has recently been employed in making bread.

Of late years French writers have been enthusiastic in its praises. They have said that sea-water is a true mineral water, extremely rich in saline principles, containing in itself almost all the most valuable medicines. It has lime to harden our softened bones, iodine to purify the blood; it has heat concentrated in it with a "*Je ne sais quoi*" of something unknown, a gelatine or mucus, which bestows form and life. More of this sort of thing in Michelet.

Salt water was, however, about a hundred years ago, used extensively in this country, and it may be well to see how its action was then described.

"Taken internally in small quantities, it proves a stimulating, healthy remedy, dissipates the finer fluids, and increases thirst. Taken in larger quantity, it proves - gative, often at the same time causing thirst. What is remarkable of the use of it is, that patients often drink it daily for a considerable time in such quantity as to purge, and that instead of losing they gain strength by it, which is certainly owing to, besides its purgative action, its giving a stimulus to the stomach and the intestines, increasing the appetite, and improving digestion, whereas most of the common purgative medicines pall the appetite and dissolve the blood at the same time that they cause large evacuations, which weaken the system.

"From our being able to keep up a purgation for a considerable time without hurting the constitution, we frequently by salt water remove disorders which have resisted other remedies. Dr. Russell wrote that he found few glandular swellings, which had not already suppured, which

he had not been able to remove by the use of sea-water. This is perhaps too general an assertion, though it has been found most serviceable in removing recent scrofulous swellings in the neck and lips, and scrofulous ophthalmias, especially when joined to the use of bark. Sea-water has likewise been found to be extremely serviceable in purging off gross humours which have been the consequences of indulging the appetite too freely, and leading too indolent and lazy a life, and in clearing the intestines of viscid mucus and of worms."

These remarks of Dr. Munro have appeared to me worth preserving, as they illustrate what has been already said about the use of salt. I have no doubt that the action of salt water is truly enough described by him; but though we hear occasionally of patients drinking salt waters, and in some country districts they do so to a considerable extent, it is a disagreeable and unpleasant remedy, never likely to come into fashion again.

Turning next to *sea-bathing*, the sea-water of the Mediterranean may be said to have $3\frac{1}{2}$ to $3\frac{3}{4}$ per cent. of salts, that of the Atlantic 3 to $3\frac{1}{2}$ per cent. The summer temperature of the Mediterranean is stated as $72^{\circ}.5$ to $80^{\circ}.6$; that of the Bay of Biscay, $73^{\circ}.4$; of the British Channel, 68° ; of the German Ocean, $60^{\circ}.8$ to 68° .

The salter waters are on the whole preferable, but the climate of a place is important; and the nearer the temperature of the sea and of the air correspond, the more suitable is a place for sea-bathing. The Baltic, with only half the salt of the open sea, is not warm enough for bathing till

August and September. On the English coasts July and August are the great bathing months, though many are able to bathe in June.

As few details can be given here about sea-bathing, suffice it to say that, in the case of delicate women and of children, it is often well to prepare them for open sea-bathing by salt-water baths in the house, perhaps beginning with them slightly warmed. Of course old people and young children are least able to bear cold water or the shock of the waves, and many nervous people are afraid of the waves, and have to be educated before they can bear their shock. It should be so managed, that those who bathe for the first time may not get frightened. It is best not to bathe on very wet or stormy days, although some make a bravado of never missing their bath. It is best to bathe naked, but men can seldom do this, and women always wear a light dress. French ladies would consider half the fun of sea-bathing gone, if they did not appear in their bathing costumes; still they can manage to be seen, without the objectionable practice of men and women bathing together, which prevails at some places. Women very generally use glazed silk caps to protect the hair, but this is a great pity, as the immersion and wetting of the head is one of the most refreshing parts of the process. True, the feeling left in the hair after salt water is not pleasant, and sea-bathing causes a good deal of the hair to fall out: but the first inconvenience can be remedied by washing the hair with lukewarm water, and not putting it up till it is dry; and as to the last, the hair will soon

come stronger again of itself. The best hour for bathing, for those who are strong, is between seven and nine in the morning : in any case it should be got over by twelve o'clock. In most places the hour depends much on the state of the tide. A little before high tide is the favourite time. The nature of the shore may make a difference. It is rough at Dieppe and Havre ; smooth at Trouville and Cherbourg. Places where the beach shelves are liked by swimmers, but are not so well adapted for invalids. The bath may vary in duration from five to twenty minutes, but long-protracted baths are injurious ; one bath a day is quite sufficient. For delicate persons, or those in whom reaction is slow, a warm foot bath of sea-water is often useful after they return from their bath. In a great number of people sea-bathing causes a feeling of sleepiness, and in some rare cases an eruption. The latter is a contra-indication to its use. The general theory of the operation of sea-bathing is, that of cold bathing with the water in motion, and with enough of salt present in it to stimulate the skin moderately.

Sea-bathing is well adapted for delicate women and girls, for men who are over-worked by any kind of business and need setting up. It improves the general health. It has a very material effect on congestion of the uterus, relaxations of its ligaments, and on leucorrhœa. It acts as a powerful tonic in irritation of the spinal system, but with limitations to be mentioned. It is useful in bracing the system of such as are always catching cold ; on the whole, no cases benefit so much as those of scrofula, particularly

in children ; now and then children suffering from incontinence of urine profit by sea-bathing.

But sea-water is capable of far more systematic application than it meets with at present. The ancients used it externally in a great variety of ways. Most of the effects of the German *soolbäder* can be produced by it. It is easy to concentrate sea-water, when it is desirable to make it stronger (some have added sea-weed to the baths), or to raise it to any required temperature. Baths in the house may in many cases of delicate persons be more suitable than baths in the open air.

Warm sea-baths are not at all used to the extent to which they might very well be. They are often more appropriate in the case of women or delicate children, in chronic rheumatism, in some neuralgias, indeed just as the *soolbäder* of which we have spoken, are employed.

In France they have done a little in this direction, in England not much.

A separate mention must be made of *scrofula*, the disease *par excellence* benefited by the sea-side. The following were found to be the results at the hospital for children at *Berck-sur-Mer*. The mean period of residence was nine months, and the cases that gained most were found to be, chronic enlargement in all degrees of the cervical and submaxillary glands, from the most recent swelling without induration, to large masses of scrofulous infiltration. These disappeared much faster than under ordinary treatment. In scrofulous affections of the joints there has often been amelioration, but in not so striking a degree. Sea-bathing at that place

appeared to be contra-indicated in chronic inflammations of the eyes or eyelids, in eruptions of simple or of impetiginous eczema, which seemed often to be aggravated, while strumous and extensive caries of the bones remained stationary.

Much of this is applicable to *Margate*, the great English place for the treatment of scrofula ; as its climate is more bracing than that of Berck, the constitutional improvement there is probably greater. Diseases of joints appear to recover in a surprising way, and cases can be operated on in that place with success, which would scarcely have been ventured on in London hospitals. The treatment in the Margate Hospital, according to information kindly communicated to me by Mr. Thornton, consists mainly in giving good food, plenty of good air and sea-bathing, with iron medicinally. It is satisfactory with reference to our vast extent of coasts, that more places are being utilized for the cure of scrofula, like Margate, although sea-bathing in England is rarely carried out on systematic principles.

Sea-bathing is usually to be *avoided* where there is a tendency to any cutaneous affection ; and if there be any eruption present, it should be smeared with pomatum or oil before bathing. Except in the form of warm baths, sea-bathing is to be avoided in gout and rheumatism. It is a doubtful measure, and must be used with much care, in convulsive diseases, chorea, and epilepsy ; in hysteria it is by no means always successful. It is to be avoided, when there is disease of the heart or blood-vessels or lungs, or any tendency to cerebral congestion.

But a short space can be spared for glancing at a few of the sea-bathing places of Europe. It is difficult to give information of any value respecting living at such places. Living is quiet and moderate one year, the place becomes popular the next, and, if fashionable, it is expensive.

The small amount of salt in the waters of the Baltic makes its sea-bathing places inferior to those on the German Ocean. Much need not be said of the few along the latter, as they are seldom visited, except as a matter of curiosity, by the English.

The chief of these are the interesting little sandstone island of *Heligoland*, the resort of the Hamburgers; *Cuxhaven*, at the mouth of the Elbe; and the islands of *Föhren* and *Borkum*. The small flat island of *Norderney*, off the Hanoverian coast, where simple quiet living may be had at a very moderate rate, has been described to me as delightful by inland Germans. Going south, we have the gay and crowded *Scheveningen* at the Hague, fashionable and dear, the chief Dutch watering-place. Next comes *Blankenberg*; like the last, situated among the dunes, and offering no advantage in the way of natural beauty, it has in a few years grown out of a fishing village into a much-frequented bath. It supplements *Ostend*, and indeed is in new hotels and other arrangements superior to that place, which is perhaps the most crowded sea-bathing place in Europe, and singularly popular—I don't know why.

The list of sea-baths as we go along the coast is large, and many are resorted to by the English. Some of them are *Dunkirk*, *Boulogne*, *Dieppe*, *Fécamp*, *Trouville*, *Cherbourg*,

a host of places along the coast of Normandy, *Arcachon*, and other places on the west coast, and *Biarritz*, as fashionable as *Tróuville*. Many of these places are admirably supplied with public rooms, baths of hot and cold salt water, swimming-baths, &c. A fair example of this is the establishment at Boulogne, and there are finer ones at Dieppe and Cherbourg ; it would be better if we had more such establishments in England. With their aid bathing may be carried on at all times ; without their aid, it is necessarily interrupted by bad weather. While Biarritz, with a bare country behind it, and no great beauty of its own, is crowded to overflowing, it is a pity that few English go on to *St. Jean de Luz*, or to the neighbouring wonderfully picturesque sea-bathing places of Spain,—*Deva*, *Motrico*, *Soutoraran*, and *San Sebastian*. Comfortable lodgings are to be had in all, and San Sebastian, which rivals Palermo in beauty, has bathing machines ; a little further on is *Santander*, and two miles beyond it the lively station of *Sardinero* ; the whole district is beautiful, and close to an important group of mineral waters.[†] We do not hear much of the English making use of Italian sea-bathing places ; but the water of the Mediterranean is the saltiest of all. *Nice*, *Leghorn*, *Spezzia*, *Naples*, *Venice*, and *Palermo* are all bathing-places. There is an admirable floating bath at Venice, and they have two establishments on the Lido in the open sea, also a marine hospital.

[†] San Sebastian has greatly advanced of late, and its capabilities may be inferred from the fact that a French and an American company were both, some time ago, anxious to establish gaming-tables there, and that one or both have succeeded in so doing.

It would be a long task even to enumerate the English sea-side places, which present every variety, from the immense scale of *Brighton* and *Scarborough* down to secluded Welsh villages like *Llanstephan* and *Fishguard*. They also present a much greater variety of coast, and have better aspects, than many French ones. Some of the best known sea-side places are, going east and north from Brighton, *Eastbourne*, *St. Leonards*, *Folkestone*, where there is a new bathing establishment, *Ramsgate*, *Broadstairs*, *Margate*, *Southend*, *Lowestoft*, *Cromer*, *Filey*, *Scarborough*, *Whitby*, *Redcar*, *Tynemouth*; or going west and north-west, *Worthing*, *Little Hampton*, *Southsea*, *Isle of Wight*, *Bournemouth*, *Exmouth*, *Dawlish*, *Torquay*, *Ilfracombe*, *Clevedon*, *Tenby*, *Aberystwith*, *Barmouth*, *Beaumaris*, *Penmaenmawr*, *Llandudno*, *Silloth* on the Solway. As regards health, the main question in selecting one of these places is, do you want a bracing climate? Then the east and south-east coast must be chosen. If you want a milder, damper climate, go to the west, to Devonshire and to Wales. Patients must judge for themselves whether they want a quiet, retired, or a bustling place; at least they are pretty sure to follow their own bent in this respect.

Scotland cannot be considered rich in sea-side resorts, as there are few of them where the arrangements are good and convenient. On the east coast, *Portobello* is fair in this respect. I have heard of a German family from Hamburg paying it a visit. They found it comfortable, and they thought the expense of it much the same as that of a German watering-place would have been; but there was

a great lack of amusement, and as for a Scottish Sunday, "What did they find it?" *North Berwick*, like the old watering-place of St. Andrews, fully exposed to the north and north-east, and fitted for those who are able to bear a bracing climate, is rising in popular favour. *Nairn*, in the north of Scotland, is a flourishing watering-place with first-rate arrangements; and some of the places down the Clyde are very good, such as *Largs*, *Ardrossan*, *Millport*, or *Rothesay*, and the scenery beautiful; but the climate is too damp.

Ireland, which is even poorer than Scotland in mineral waters, is particularly rich in sea-bathing places. Almost all of these are in the neighbourhood of fine cliff scenery, and many have excellent hotels. For instance, one of the most comfortable of all is *Portrush*, near the Giant's Causeway. Going along the coast towards the south, you come to the secluded *Cushindall*, and to *Glenarm*. Next comes one of the newest and most popular, *Newcastle*; then *Ross Trevor* and *Warrenpoint*, as lovely as can be. Passing Dublin you reach *Bray*, more in the style of a new English watering-place, with its sea-views, reminding you on a fine day of the coast of Italy. In the south, near Waterford, *Dunmore*, chiefly the resort of the wealthier, and *Tramore*, of the middle classes. In the west, *Kilkee* and *Bundoran*, both open to the full sweep of the Atlantic, the one half embayed, with lofty rocky scenery in its neighbourhood, the other commanding gloriously wide sea-views; but the field for the choice of such places in Ireland is ample.

CHAPTER V.

ALKALINE WATERS.

SOMETHING has already been said, under the head of Earthy Waters, of the operation of magnesia and of lime on the system. Soda in the form of carbonate is the alkali which is present in considerable quantity in alkaline waters. The proportion of potass is small, and that of lithium still less.

It is pretty certain that the fibrine and albumen of the blood are kept in a state of solution by the presence of alkalies. Soda is the alkali the presence of which is most important in the human system—far more important than that of potash. The system is by no means so tolerant of potash, as it is of soda. Potash acts more on the kidneys, appearing to keep urea in solution, while soda is the fluidifier of the blood. The latter is found in the blood combined with chlorine, with phosphoric and carbonic acids. Most of the fluids of the body are indeed alkaline. The saliva is commonly so ; bile has a weak alkaline reaction ; the mucus of the whole intestinal canal is alkaline ; the urine in man is usually slightly acid, and it is one of the functions of the kidneys to remove excess of alkalies from the system. The

physiological operation of the alkalies is very imperfectly known. It is probable, although it is not proved, that alkalies accelerate, while acids retard oxidation. Two modes of the operation of alkalies are undoubted; their chemical action on acids with which they come in contact in the system, and the fact that their presence is essential to the formation of bile.

Large doses of alkalies readily make the urine alkaline, and it is believed render other fluids of the body so also. The salts of soda are diuretic; the carbonates more so than the chlorides. The carbonates and bi-carbonates act most directly on the system; but all the combinations with vegetable acids are rapidly decomposed in the stomach. It is only in small doses that alkalies assist digestion, and thereby the nutrition of the system; in large doses they have been proved by experiments on animals to obstruct assimilation. There is no question that the continued use of large quantities of alkalies is very lowering to the system, mainly through altering the consistence of the blood, and making it more fluid.

The theory of the use of alkaline waters has hitherto rested mainly on their chemical action on the fluids, their saturating acids, and their producing alkalization; granting that there may be such a condition, will alkaline waters in the quantity that is usually drunk, induce it, and how long does it last, after their use has been given up? This notion of counteracting acidity at once leads us to the digestive processes, and affections of the stomach.

Dyspepsia.—There are no cases more likely to profit by a

resort to a suitable spring than dyspeptic ones. The symptoms of this complaint (the disease indeed is in one sense only a symptom) need not be described here.

But a state of things which often occurs in those who have resided long in the tropics, and have no organic disease, is this. There is a feeling of nausea on getting up in the morning, leading either to hawking up a little mucus, or sometimes to vomiting up the contents of the stomach. In such cases elongated uvula is very frequent, and by its irritation it keeps up a short cough. There is often also a relaxed state of the throat, and a granular state of the pharynx. The condition comes close to that of laryngo-pharyngitis, only the voice and larynx are not commonly affected. After regulation of the diet, which is a very important point, the use of an alkaline water will often aid to remove these symptoms of disturbed digestion.

In functional diseases of the stomach generally, alkaline waters may be useful, first, in relieving acidity, and secondly, in influencing favourably the innervation and peristaltic action of the bowels. True mucous catarrh of the stomach—and writers are by no means agreed as to what constitutes this—generally requires some more powerful waters; when diarrhœa is mild enough to come under the designation of intestinal catarrh, small doses of the warm alkaline waters may be of use.

Liver.—Whatever the specific action of soda in the secretion of bile may be, it is certain that enlargement of the liver often disappears under the employment of alkaline

waters, though probably not so fast as under that of more purgative ones.

However the desirable effect is produced,—and the emulgent effect of large quantities of water must help the passage of all stones,—I have known patients suffering fearfully from gall-stones recover their health completely by periodical visits to alkaline waters. No doubt assisting causes may be found in the facts, that the increased consumption of water favours the secretion of bile, and that quickened action of the intestinal canal stimulates the liver.

There is little positive evidence that simple alkaline waters are of use in enlargements of the spleen.

Diabetes.—On the idea that want of soda is the reason why sugar does not convert itself in the blood, soda was for a long time used in this complaint. The general conclusion arrived at concerning it seems to be this, that while continued long and given in large doses it is distinctly injurious, in smaller doses, again, it has often proved of positive, at least temporary benefit. This may arise either from a favourable action on the liver, disorder of which is at the root of diabetes, or from moderating the excessive secretion of acid common in diabetic patients. But whatever the theory of its operation may be, most practical writers have recognized the usefulness of small doses of alkalies in diabetes. Vichy and Karlsbad waters have their rival advocates, and the effect of both depends mainly on the carbonate of soda which they contain. Various sagacious physicians have satisfied themselves that these waters, whether from their

thermality or other cause, are more efficacious than the simple exhibition of carbonate of soda. It is in the early stage and in the milder forms of the disease that benefit is to be expected. Some, however, write more sanguinely.

In *lithiasis*, or the tendency to form stone in the bladder, much was for a long time expected from the chemical action of waters ; but hopes have been disappointed. Munch's experiments show, that although the use of carbonate of soda at first diminishes the quantity of lithic acid in the urine, this effect after a time disappears. When actual concretions have been formed in the bladder, it has never been known that they have been diminished in size or dissolved by alkaline waters ; nay, there is even some suspicion that the latter have sometimes led to the formation of them.

Ample dilution with hot water is probably the secret of success in some cases of gravel, as also in vesical catarrh, and in affections of the kidneys, in which alkaline waters have been employed, in most of which cases the simultaneous action of baths on the skin is not to be overlooked. In such cases no doubt the actual alkalescence of the mineral waters helps, and the presence of a little common salt does not interfere with the alkaline action.

In *gout* alkaline waters are often found very useful. They were given on the theory that they were to saturate lithic acid, which in cases of gout was supposed to be in excess in the system ; but the modern view is that there is a deficiency of lithic acid. The undoubted efficacy of such waters probably depends on their favouring retrogressive changes and

the absorption of fat ; as treatment by alkaline waters is essentially lowering, it is only in the more active forms of gout in the robust that these waters are indicated.

Mucous Membranes.—It has long been known empirically that the use of alkalies tended to diminish catarrhal discharges. This effect was produced, probably not, as was commonly thought, by the alkalies softening them, and making them thinner ; but rather, while they diminished their quantity, by making them more consistent ; and a recent theory has been propounded that alkaline solutions excite ciliary movements on mucous surfaces, and thus lead to altered action of them.

Respiratory Organs.—Alkaline waters are accordingly often found useful in chronic bronchial catarrhs, and, as they are generally thermal ones, their warmth no doubt greatly facilitates expectoration. In the same way, in some forms of consumption connected with acidity of the stomach and impaired digestion, alkalies are often used with advantage, and we can understand how some of the alkaline waters abroad have obtained a reputation in incipient phthisis. They are also much used in all laryngeal affections, and in vesical catarrhs, as already mentioned.

Diseases of Women.—Slight vaginal catarrh is often treated with alkaline waters, but more by their local use than by drinking. Such cases may require internal treatment of a more tonic character. If an anæmic condition is present, they are contra-indicated.

The number of powerful alkaline waters is not great. In fact they are only drunk at a few sources, while there

is an immense export of such waters. In examining the following table, it is to be recollected that they almost all contain more or less of common salt, and that the quantity of carbonic acid is stated variously by different observers.

TABLE OF THE CHIEF CONSTITUENTS OF THE CHIEF
ALKALINE WATERS.

	TEMPERATURE.	CARB. OF SODA.	CARB. OF MAGN.	COM. SALT.	CAR- BONIC ACID.
Néris	114° — 125°	4.1	1.8	1.7	..
Teinach . . . . .	..	5.9	..	.8	..
Wildungen, Sa. . . .	..	5.9	8.6	10.5	29.3
Mont Dore	100 — 114	6.3	7.9	3.8	..
Geilnau . . . . .	..	7.6	..	5.8	39.5
Neuenahr, A.	92 — 97	7.8	4.4	.9	18.8
Selters . . . . .	..	8	4.6	22.7	20.3
Soultzmatt . . . . .	..	9.5	3.1	.7	33?
Royat	80 — 95	13.4	6.7	17.2	6?
Ems, K.	85 — 115	13.9	2.8	10.1	18.9
Châteauneuf	59 — 100	16.20	4.3	3.1	36?
Salzbrunn, O. . . . .	..	17.4	6.3	1.7	46?
Heilbrunnen . . . . .	..	18.2	10.7	14.1	38.8
Vic-sur-Cère . . . . .	..	18.6	6	12.3	21?
La Bourboule	107 — 125	19.4	2.8	39.6	23?
Fachingen . . . . .	..	22.1	4.6	22.7	20.3
St. Nectaire	54 — 111	24.6	6.7	26.9	24?
Gleichenberg, C. . . .	..	25.1	7.8	19.5	27
Bilin, J. . . . .	..	30	5.4	3.8	26
Vichy, G. G.	105	37.7	5	5	26
Luhatschowitz, V. . .	..	30 (59)	6.5	32.9	38
Vals la M. . . . .	..	54 (9-62)	3	1.6	53?

Vichy, reached direct by rail from Paris.—This is by far the finest alkaline bath in Europe, and the greatest thermal establishment in France, overcrowded every season. It lies on the Allier, in a country not remarkable for beauty,

although Madame Sevigné could write in raptures of it. There is a handsome casino, and abundance of hotels to suit all tastes. There are shady walks in front of the baths, and a pleasant piece of garden laid out on the banks of the river. I have not space to describe the baths in detail, or the manufactory of Vichy lozenges, or the arrangements for bottling and exporting the waters. There is a large military hospital here.

The chief objection to the climate is, that in the height of summer it is intensely hot—unbearable in July.

The chief wells are the *Grande Grille*, *Puits Carré*, *Hôpital*, *Celestins*, *De Mesdames*, and there are many others. The general constitution of all the waters is alike, and they owe their virtues to the carbonic acid and carbonate of soda present, as appears from the analysis of one of them:—

THE GRANDE GRILLE.

Carbonate of Soda	37.7
„ „ Potass	2.7
„ „ Magnesia	5
„ „ Lime	3.1
Sulphate of Soda	2.9
Chloride of Soda	5.3

with carbonic acid gas 26. There are also minute quantities of phosphate of soda, arseniate of soda, of carbonates of strontium and of iron, to which it is impossible to attach much significance, although the practitioners on the spot explain the varied operation of the waters according to their presence or absence. The quantity of water drunk is two to four and six glasses. The use of the baths is also commonly associated with drinking. The average temperature

is 90° to 91°, and patients stay in them twenty to forty minutes. The Celestin, only 58°, is pleasantest to drink.

The great majority of patients who resort hither, come for some urinary affection—gravel, catarrh of the bladder, diabetes ; many with stone already formed look for its solution, or at least for the prevention of further formation of concretions. Cases of gout come in great numbers, but it is only those whose constitution is not much weakened who are fit subjects for these waters ; also cases of dyspepsia, of engorgement of the liver and spleen. Cases of the first kind benefit here, but spleen rarely or never ; in some cases of biliary calculi these waters work wonders. The Vichy waters diminish obesity, as doses of potass and other alkalies do, the theory being that the alkali combines with the fat and removes it as a sort of soap. Ladies also come here for many uterine affections, and the careful employment of the waters in drinking and in baths and douches is often of use.

The following is a statement of the results of observation in the military hospital :—Vichy is a true harbour of refuge for soldiers from Algiers and from the tropics : a specific in chronic dysentery, where there is no grave lesion, and in chronic enlargements of the abdominal organs ; also in cachectic conditions, the result of paludal poisoning. These are strong and confident statements.

There are many private springs in Vichy besides those belonging to the establishment. Almost in it are *Abrest* and *Vaisse*. There are comfortable baths at the village of *Cusset*, two miles off. I can only enumerate some of the

springs in the district : *Haute Rive*, *St. Yorre*, *Chateldon*, *Châteauneuf*, and *Chatelguyon*, all more or less used.

Vic-sur-Cère, in Cantal, in a strikingly picturesque country, is about 2,100 feet above the sea, and has its well within a stone's cast of the railway station. It contains about 18 parts of carbonate of soda : with this are associated about 11 parts of common salt, and 7 or 8 of sulphate of soda, with minute quantities of iron and of arseniates, with quite as much carbonic acid as Vichy. These waters have risen into considerable importance of late years, owing to the varied nature of their constituents, the sulphate of soda giving them a slight resemblance to some of the Bohemian wells. They are lauded in urinary affections, congestion of the liver, and even in rebellious intermittents. Vic is a quiet old town, with shady walks.

Chaudes Aigues has weak alkaline springs, of a temperature from 143° to 178° . Their great heat has been utilized in heating the town in winter by means of water pipes. It lies in Cantal, out of the way in a gorge separating Auvergne from Gevaudan. Living is cheap enough, and the neighbourhood not without attractions, but the number of visitors is small. Like other very warm waters, these are used chiefly for rheumatism and enlargement of the joints.

Mont Dore, one of the chief and best-managed establishments in France, is in the valley of the Dordogne. It is reached in six or seven hours by diligence from Clermont, and lies high up (3,300 feet) among the volcanic mountains of Auvergne, in a very interesting country. It has one cold and six thermal springs. They are feeble alkaline ones, the

strongest containing 6.3 parts of carbonate of soda ; temperature, 90° to 104°. The waters are used for drinking, for baths, and for douches, and there are inhalation-rooms. July is the chief season, although the season extends from 15th June to 15th September, by which time it gets very cold.

It is especially in the treatment of chronic bronchitic attacks and in threatening of consumption that Mont Dore has its great reputation. Baths of a considerable temperature form the chief element of treatment ; and if they are really useful, the question suggests itself, whether in our management of phthisis we usually pay sufficient attention to the condition of the skin ? whether the use of baths in the treatment of that disease is not too much overlooked ? and this the more particularly, when phthisis is no longer regarded as the result of unavoidable hereditary inheritance, but often as the consequence of catarrhal pneumonia.

Baths are also used at a very high temperature, and are considered to be very effective in rheumatism and in paralysis. Some have attributed a portion of the virtues of these waters to the small quantity of arsenic present in them.

The place contains some interesting Roman remains, and many pleasant excursions may be made from it.

La Bourboule, four miles from Mont Dore, lying lower at the foot of a large granite rock, is a village which, though its wells were long known, has suddenly sprung into reputation. It now counts more hotels than houses—many of them and

the new casino are unfinished. It has already five doctors. There are two rival private bathing establishments, which have from time to time cut off each other's supply of water. I believe that now both baths are supplied by water of the same constitution. A third spring has just been found.

These springs resemble those of St. Nectaire and Royat, but, according to our analysis, they differ from them in containing as much as 14 or 15 parts of sulphate of soda, thus resembling some of the Bohemian wells; but what has brought these waters especially into notice, is the fact of their containing the largest quantity of arsenic hitherto recorded in any waters.

These waters, having a high temperature, are recommended in much the same cases as Mont Dore, especially in paralysis and thickened joints. Bronchitic affections are also treated here. They ought to be useful in congested liver, and in affections the result of paludal cachexia, independently of their arsenic, which is supposed to make them specific in intermittent fever, and other maladies. I found Paris surgeons sending cases too late in the year.

Royat, almost in the suburbs of Clermont, lies in a volcanic gorge, at a height of about 1,400 feet above the sea. It has a new bathing establishment and good drinking fountains. There are several hotels, and the place looks stirring. There are many objects of interest in the immediate vicinity.

The waters are of a temperature of from 82° to 95°, and in their constituents bear a very strong resemblance to those of Ems.

Anæmia, dyspepsia, mucous catarrhs, and rheumatisms are the diseases most treated here.

St. Nectaire, another bath in the same district, has lately been recovering its reputation. It consists of a lower station with two bathing establishments, and an upper one with a single establishment. They are all sufficient, but stand in need of improvement, especially the lower ones. The waters vary in temperature from 54° to 129° ; they are more used for bathing than for drinking. They have a very large supply of carbonic acid, which is used here in various local applications.

The diseases which profit most are scrofula and debility in children; many of the diseases of women, in which the waters are used locally, and are pronounced to be favourable to fecundity. A speciality has been made of the application of douches of water to the eyes; and good results are said to have been obtained in granular ophthalmia, in pannus, and even in some opacities of the cornea.

The village and its church are quaint, the country round broken and curious, and living is moderate.

Vals, in Ardèche, now, I believe, only a two-hours' drive from the railway at Privas, has been of late years, like Bourboule, constantly before the world. It lies in a picturesque valley in a volcanic country, and possesses no fewer than thirty cold springs. They contain so much carbonate of soda (varying from 8 to 62 parts), that probably Luhat-schowitz is the only place that can compete with it at all. For a long time the waters were chiefly heard of for exportation, but latterly establishments and hotels have

sprung up, and there has been a considerable concourse of visitors. The waters are doubtless applicable wherever cold alkaline waters with a good supply of carbonic acid are indicated.

But the promoters of Vals, not satisfied with its just claims, have been foisting on the world a weak spring called the Dominique; and because it contains some arsenic, its action is represented as tonic, sedative, reconstituent, febrifuge, and antiperiodic.

Every amount of success that the best cold alkaline waters can attain, ought to attend Vals.

Néris stands high in an uninteresting country in the department of Allier, has waters of a temperature of 113° to 125°, feebly alkaline, containing scarcely more than three grains of carbonate of soda and one of lime in sixteen ounces. But the bath belongs to Government, and the bathing arrangements are very complete indeed. The waters, which were known to the Romans, are chiefly used as baths; they have a great reputation for calming neuralgic and hysterical conditions, and are doubtless useful in rheumatism and in such uterine affections as mild thermal waters are applicable to. They are scarcely known to the English.

Néris is rather a dull place, but has a number of pleasant promenades and nice-looking hotels. Now that it is only a short drive from the railway at Mont Luçon, it may perhaps be more visited.

“L’une des sources d’Alsace qu’un odieux traité nous arrache, mais qu’il nous faut continuer à tenir pour Française,” in the words applied to it by the poor French.

Soultzmatt, in an agreeable valley in the eastern part of the Vosges, has the advantage in mineral constituents over Mont Dore and Nérès, although its mineralization is very weak : it has plenty of carbonic acid gas, and an infinitesimal amount of boracic acid. The waters for the present are chiefly exported ; they are indicated where weak alkaline waters are desired.

Heilbrunnen, in the interesting volcanic valley of Brohl on the Rhine, deserves a notice here, owing to the unusual amount of magnesia which its waters contain, and which in this respect has much resemblance to the Salz spring at Wildungen. For the present it is only exported, but taken in connection with the pleasant acidulous *Tonnistein* spring close to it, and a strong chalybeate not far off, a future of some future importance seems possible. There is a small bathing establishment and comfortable hotel, and grounds have been laid out for visitors.¹

Considering that Tonnistein was well known and appreciated 200 years ago, it is surprising that the efforts made of late years to revive this interesting station have not met with more success. It is four miles from the railway.

Ems has been termed by a very critical German the pearl of baths, and an enthusiastic Frenchman has called it the violet ; we cannot therefore be far very wrong in considering it a desirable place—and a very pretty, pic-

¹ The Brunnen and Bade Verwaltung of Brohl should learn to write less comical English. While telling us that "lovely nature far and near will make a stay at our place very pleasing," they mention that their waters are useful "in chronic blenorrhœa of the bronchial artery, and that they cause a general laxativeness without colics."

turesque spot it is ; its social attractions are thus described : “ Il y règne un esprit de bon ton, de distinction parfaite, sans roideur, sans morgue aristocratique.” Ems is so well known, that much need not be said of it.

The waters are mild alkaline, and the new and strongest one may be said to contain 15.3 parts of carbonate of soda, which is equivalent to 21.7 of the bicarbonate, with an abundant supply of carbonic acid.

Two of the springs are used chiefly in drinking,—the *Kraenchen*, temperature 85°, and the *Kesselbrunnen*, 115° ; the others, and especially the *Fürstenbrunnen*, 95°, and the new well, 117°.5, are employed for baths ; while the *Bubcnquelle*, 104°, is used only for uterine douches, at a temperature of 90°. A lately discovered chalybeate is of no great value.

This is the most popular women's bath in Europe. It need scarcely be said that no waters cure sterility, while the careful use of douches of these mild alkaline waters may be useful in improving certain local conditions.

Ems waters are particularly useful in simple catarrh of the stomach. That affection is best treated by the warmer waters, while simple dyspepsia finds more relief in the colder ones. In like manner the waters of Ems have been found useful in chronic diarrhœa, and in the sequelæ of dysentery.

On the whole, Ems is perhaps best suited for cases of bronchial and laryngeal catarrh, in whose favour is the mild and moderately moist climate of the place, which lies sheltered between high hills on the banks of the Lahn.

All the public rooms are on a large scale, and there is abundant variety of amusements.

There are carbonic gas inhalation-rooms here. Their success was once much puffed up, but they are falling into neglect.

Neuenahr, in the valley of the Ahr, not far from the Rhine between Bonn and Coblenz, has of late years come into notice. It has new showy buildings. It is near the very interesting scenery of Altenahr, but for the present it wants shade; it possesses feeble alkaline sources. The temperature of the waters varies from $72^{\circ}.5$ to about 105° ; and there is an abundant supply of carbonic acid, from 18 to nearly double that amount.

These waters have become very popular, and are much frequented for the same complaints as Ems. They contain about half as much soda as the waters of that place, and scarcely any salt; but Neuenahr has the advantage over Ems of not being so shut in. Its springs profess to be useful in pulmonary affections, even in phthisis and emphysema of the lungs, catarrh of the stomach and bladder, hypertrophy of the liver, gouty diathesis, hysterical affections. They have been found specially useful in diabetes and in biliary calculi, like the stronger alkaline springs. No doubt these waters can effect anything to be fairly expected from warm carbonic acid waters with a little alkali, but it is difficult to assign them a place very different from the waters which have enjoyed the longest and most constant popularity, *i.e.* the indifferent thermal ones. There are baths, douches, and inhalation-rooms.

Fachingen, in the valley of the Lahn, and *Bilin*, near Teplitz, contain as much as 22 and 30 parts of carbonate of soda, and plenty of carbonic acid; the waters are almost exclusively used for exportation, which is increasing.

Teinach, fifteen miles from Wildbad, is a similar place; but its waters, weak alkaline ones, which have rather more mineral constituents, are cold. They have, however, a good supply of carbonic gas. It also has an iron spring.

Salzbrunn, in Upper Silesia, an hour and a half's drive from Freiburg, lies at a height of 1,220 ft. Its strongest well contains 17.4 parts of carbonate of soda; the weaker one 12.8. This place has been called the cold Ems, and was formerly in high repute in phthisis. It is now perhaps more neglected than it should be. It is extremely useful in disordered digestion, and in some bronchitic affections. The drinking cure here is more important than the bathing. It has comfortable hotels and lodgings, and pleasant walks. It has a bracing, while Ems has a relaxing, climate.

Gleichenberg, not many miles from Gratz in Styria, has a considerably more alkaline spring than Ems. The amount of carbonate of soda is variously stated at from 20 to 27, of common salt 19.5, with about 7.8 parts of carbonate of magnesia, and some lime. There is an abundant supply of carbonic acid. The climate is excellent, and the whole district attractive. Of late years this place has been becoming very popular; there have been 2,000 visitors, and English have resorted to it more. Fresh accommodation has been provided for visitors, and some new springs have been discovered.

Fideris, weakest though it be of alkaline waters, deserves notice because it was described 300 years ago by Conrad Gessner, and as it is in a district of Switzerland to which the attention of the English has been drawn of late. It has a small establishment, and is always overcrowded with Swiss ; it is recommended for children and anæmic persons, in threatened tuberculosis, and especially in dyspepsia.

Luhatschowitz, about ten miles from Hradisch, on the northern line of railway from Vienna, is about 1,700 feet above the sea, in a pleasant valley among the Carpathian mountains. The climate is mild, and inclined to be damp. The analysis of this water given above, shows that it is perhaps the strongest alkaline one in Europe, the palm lying between it and Vals. The latter place probably excels it in the number and abundance of its wells, while the quantity of common salt present is much less than in the former one. The springs are used chiefly for drinking ; there is a ewe whey establishment here, but the place is too new to judge yet of its future. There were some time ago sixteen lodging-houses, and only one hotel.

CHAPTER VI.

PURGATIVE WATERS.

NONE of the waters that we have hitherto considered have any purgative or laxative properties, except those containing chloride of sodium or carbonate of magnesia ; but soda and magnesia often exist in combination with sulphuric acid, which imparts a new character, and so well marked a one, that they may be termed purging waters. They are a very important, though not large, division of mineral waters, but of their operation,—as Liebig's views on the subject, that they act by producing increased exosmosis, are not generally accepted,—very little is known beyond the mere fact of aperient effects. Sulphates of soda and of magnesia in small doses cause diarrhœa ; in large ones (although when injected into the veins they do not appear to act in this way), catharsis.

The sulphuric acid of the sulphates taken up by the stomach, is chiefly excreted again through the kidneys, and is found partially in other secretions. The greater part of the magnesia and soda probably leaves the system unused.

In the excretions produced by these salts, are found, besides

water and the remains of food, bilious matters, some of the acids of digestion, and some remains of the salts themselves. These salts were not known to operate specially in any way on the nervous system. Recent experiments, however, seem to show, that sulphate of magnesia in large doses, though in a much less degree than sulphate of potass, acts on the muscular tissue as a poison, and through it on the respiration and the heart. Sulphate of soda can be given with safety in much larger doses than sulphate of magnesia. In small doses neither of them acts as a poison ; but a continued use of large quantities of earthy and of alkaline sulphates is injurious to the digestive organs. Indeed, there is evidence that sulphate of soda diminishes the coagulability of blood, and thus favours hæmorrhage.

Sulphated waters exist in a stronger form, when they are chiefly exported and used as a substitute for ordinary aperient medicine ; and also in a weaker form, when considerable quantities of common salt and of carbonate of soda are usually present.

The latter class of waters occurs at many of the more important spas, and their operation is peculiarly valuable. The quantity of purging salts present is, comparatively speaking, so small in most of them, that we must look to something more than their mere purging action to explain their beneficial effects. Their general operation has been thus described. They always produce a certain loss of substance to the system, chiefly at the expense of its fat, without the muscles bearing any share in it, and without impairing the appetite, the digestion, the general powers of assimilation,

and the feeling of health. A lowering of the powers only results from the use of an excessive quantity of such waters. These waters are used most in abdominal disorders : 1, to improve digestion and the action of the bowels ; 2, in affections of the liver and spleen ; 3, the mild use of them is indicated in the same cases as those of the alkaline waters.

German practitioners of the old school should find themselves in a paradise among wells of this description, the favourite cures for their ever-present idea, *abdominal plethora*, or venous dyscrasy. This term includes hypochondriasis and hæmorrhoids, and many of the affections of middle age, supposed to be caused by indulgence in over-nutritious food and by sedentary habits, and which results in a disproportion between the power of the heart and the amount of blood to be propelled, leading to retarded circulation, especially of the portal system. By their purgative action, the stronger of these waters derive from the head, and the deep-seated organs. Quickening the abdominal circulation, and regulating the peristaltic action of the bowels, they as it were lighten the system, and remove congestions.

They are considered particularly useful in cases of *hæmorrhoidal* congestion, bringing on crises in piles, and restoring what many Germans seem to regard as a natural function. They are more useful in full-blooded, big-bellied, sanguine men, who are the better for getting rid of a portion of their superfluous fat—for that class of hæmorrhoidal patients—than for the thinner, sallow-faced yellow-conjunctivaed class, with low spirits and hypochondriasis, who of all things do not require further lowering treatment.

There can be no question that these waters are powerful agents in simple congestion and enlargement of the *liver*; that large livers diminish rapidly in bulk under their use. Such beneficial effects cannot, of course, be expected in cases of structural change, as in cirrhosis; and in suspicion of the presence of hepatic abscess, the use of such waters, owing to their lowering quality, must be worse than useless.

It seems to be quite proved, that enlarged *spleen* is often reduced in size by the employment of these waters, aided by what is generally considered a very powerful adjuvant in such cases, the peat-baths; but although change of air, such as is got in travelling, is of much use in spleen disease, it is questionable whether any bath treatment is nearly so effective as the ordinary treatment by steel medicines. It is worth observing, that a combination of the neutral salts and of iron has long been a popular remedy for spleen in India, and that some of those waters, which in addition contain steel, have a considerable analogy to such a preparation.

These waters, when carbonate of soda is present, are generally useful in the same catarrhal states in which the alkaline waters are found beneficial; but their greater activity of operation must be borne in mind, and they are not in these cases so useful as the alkaline waters, while it seems probable that they are more active in gout and in lithiasis; they also have sometimes given encouragement in diabetes, and Karlsbad waters have been used, nearly as much as Vichy ones, in that condition of system in which there may be an excessive production of glycose, an imperfect oxidation of it, or a combination of both conditions. Such waters are

naturally most useful in cases in which the affection is the result of a sedentary life, and when more activity of the abdominal circulation is desired.

We shall first consider the *purging waters*, which contain notable quantities of sulphate of magnesia, as well as of soda.

The general composition of these purging waters will be best understood from the following rough table of their chief constituents:—

	SOLIDS.	SULPH. MAGNESIA.	SULPH. SODA.	COMMON SALT.	CARBONIC ACID.
Hunyadi, Ofen . . .	350.48	160.1	159.1	..	5.2
Püllna	322.8	121	167.1	..	5.2
Birmerstorf	285	202	64	..	..
Friederichshall . . .	252.4	51.4	62.5	118.7	6.9
Saidschütz	233.3	109.9	66.1	..	..
Kissingen, B. . . .	230.7	57.4	60.5	79.4	4.5
Uriage	141.1	25.6	22.9	72.3	..
Beulah	129.3	92	..	22.2	3.2
Cheltenham, M. . .	117	18.2	23.2	71	..

The stronger ones of these waters are not drunk at their sources. They are only exported—and they are simply to be regarded as convenient purgative waters. The two most popular, and which are most used all over Europe, are the *Püllna* and *Friederichshall*. Patients will take them more readily than similar preparations made at a chemist's, and I have known them used with great comfort in habitual constipation for considerable periods, apparently not losing their power, or acting injuriously in any way on the system. The new *Ofen* water appears to be an excellent aperient. It may be observed that the common *Seidlitz* powder of potassio-tartrate and carbonate of soda, with tartaric acid, is not in the slightest degree analogous in composition to that of the

waters, from which they derive their name. They consisted mainly of sulphate of magnesia, and have been quite superseded by *Saidschütz*, which is close by. There is no necessity for discussing here the operation of purgative waters not drunk on the spot; and the original *Epsom* well, from which the salts have got their name, and which the people of London used to resort to, is now enclosed within a garden, and only a stray application is now and then made for permission to drink them. This applies also to the similar waters of *Beulah*, of which an analysis is given. Of the many wells of this kind near London once popular, those of *Streatham* appear to be the only ones now at all used.

Cheltenham, in the West of England, has quite fallen from its high estate; from being a crowded bath with 12,000 to 15,000 visitors annually, it has dropped into comparative neglect. It is nevertheless a large city, with good houses, and trees planted in the streets after the fashion of a foreign town. It is a desirable place of residence; its climate is mild, and sometimes complained of as relaxing. It has more than one pump-room and establishment. An analysis of the principal source has been already given. The *strong saline*, owing to the quantity of common salt that it contains, has many points of analogy with Uriage, while the *sulphur saline* is more akin to St. Gervais.

It is evident that the effects of the waters must vary a good deal, according as the large quantity of common salt is taken or not. The waters are employed chiefly in drinking. They were much used for the livers of old Indians in dyspepsia, and also in chlorosis and anæmia, and there is no

reason why these waters, if used judiciously, should not be found efficient. What is sold under the name of Cheltenham salts contains a good deal more of sulphate of soda than the natural waters.

Cheltenham salts continue to be manufactured from the water, which enjoys a very considerable repute with the people of the place as a purgative.

Two or three other English wells of this class can only just be mentioned.

Cherry Rock, near Kingswood, Gloucestershire.—Much is not heard of it.

Purton Spa, near Swindon, is known in the neighbourhood. If the analysis can be trusted, it contains about 5 parts of carbonate of potass, and a fair amount of carbonic acid.

Melksham, near Trowbridge, has a well with about 200 parts of solid constituents, nearly two-thirds of which are common salt. It was once in favour, but is now neglected.

The next two wells differ from the last ones in containing little or no sulphate of magnesia.

The baths of *St. Gervais* lie in a valley about 2,000 feet above the sea, not far from Chamounix, and therefore in the centre of the most magnificent scenery in Europe.

There are four principal springs, varying in temperature from 77° to 126°. Besides common salt and sulphate of soda, they contain in addition some sulphate of lime. They also have small amounts of hydrosulphuric acid and of iron. The baths can be used at the natural temperature of their waters.

The waters, which when drunk are slightly aperient, are

found to be useful in some eczemas and eruptions depending on disorders of the digestion, in chronic bronchial catarrhs, and are reckoned especially efficacious in neuralgias, and in cases of head affection the result of overwork, in the production of which effects, doubtless the Alpine climate co-operates with the slight derivative action of the waters. There has been for a long time a large bathing establishment here, to which a hydropathic establishment has been lately added. Season, from 1st June to 15th September.

Leamington, in Warwickshire, is a well-known and agreeable place of residence; according to the analysis of its waters presently given, they have some analogy with one of the Cheltenham, and with one of the St. Gervais wells, particularly the one of the latter which contains a good deal of lime, but it is more distinctly purgative than either. Here, as at Cheltenham, the public arrangements are excellent, and the waters are found useful in dyspepsia and affections of the liver.

Scarborough.—The strong sulphate of magnesia wells of this place, have that salt so nearly equally balanced with sulphate and carbonate of lime, that they must lie heavy on the stomach; owing to their containing a small quantity of iron, they have been considered to be tonic.

The next group of *purging waters*, though a small, is a very important one. They differ from the stronger purging waters in containing no sulphate of magnesia. Their action is a good deal modified by even the small quantity of carbonate of soda which they contain; one of them only is

thermal—Karlsbad. The four, although one is in Saxony, are in the same district, and may be grouped as the Bohemian baths. Tarasp in the Lower Engadine is distinguished from them by the larger quantity both of carbonate of soda and of common salt which it contains. Possibly the late analysis of the waters of Ischia, or of some others in the Bay of Naples, may show that some of them are analogous to Tarasp.

This is the class of waters the possession of which the French envy the Germans so much. The French are as puzzled to find any real purgatives among their springs, as the homœopaths are to discover such remedies.

	TEMP.	SOLIDS.	CARB. SODA.	SULPH. SODA.	COM. SALT.	CARB. ACID.
Karlsbad, S. . .	121°—164°	54.2	13.6	25.2	11.3	7.6
Marienbad, F. . .	..	95.4	12.9	50	20	29.6
Franzensbad, F. . .	..	55.8	7.8	33	11.6	34.5
Elster, T. . . .	..	57.5	5.1	29.4	18.6	21.7
Tarasp, St. L. . .	..	121.6	35.5	25.4	38.3	45.4
Bertrich	90°.5	17.5	1.8	9.2	4.9	3.3
Füred . . . . .	..	22.7	1.0	9.5	.9	30.5
Rohitsch . . . .	..	54.2	7.5	19.2	1	43
St. Gervais . . .	77°—126°	51.6	1.2	28.2	17.9	..
Leamington, A. .	..	134.9	..	52.7	52.3	..

Karlsbad is in many respects the most striking bath in Europe, as it is one of the most frequented.

The mass of steaming water of the Sprudel, and the strange site of the place among the overhanging rocks selected for it, at once arrest attention; and on closer investigation the waters are found to be among the most powerful in use, not waters with which you may trifle with impunity. Although in the height of summer the place

becomes intensely hot, there are sudden alternations of temperature.

The walks in all directions among the woods are beautiful, and the views varied, but the hills are steep, and many invalids are unable to ascend them on foot.

The hotels are comfortable, but not of the latest fashion, and there are no *tables d'hôte* here; so that although there is an immense concourse of visitors at the baths, they are not particular favourites with the English. There is a look of dampness and want of repair about many of the buildings over the wells, though a magnificent new bathing establishment has lately been completed at the expense of the municipalities. The new colonnades are a great addition.

The three chief of the eight wells—the *Sprudel*, *Mühlbrunnen*, and *Schlossbrunnen*—agree with each other in chemical composition in all essentials. They are in temperature 165°, 126°, 125°. The water of the *Mühlbrunnen* is commonly best borne by the stomach. The dose is two to six glasses daily, sometimes increased to eight and ten, and even more. The amount of water drunk should be diminished whenever there is a tendency to watery dejections; and that this is the first palpable operation of the waters, is very plain from the number of *cabinets* scattered among the woods, and which diffuse an odour that calls loudly for hygienic measures.

In former times these waters were used chiefly for bathing; but now baths are the least important part of the cure. Stories of these waters producing peculiar electrical states of the system must be received with caution. Practitioners

on the spot detect different operations of the different wells. These waters are the great remedy for enlarged and fatty livers, for congestion of the uterus, and of the portal system. They seem also, like the waters of Vichy, to have certain virtues in gall-stones, the *rationale* of which it is not easy to explain. They are also used in many of the other complaints for which Vichy is employed. Seegen has met with most satisfactory results in diabetes. When active effects on the abdominal viscera are wanted, Karlsbad is best. Where there are urinary complications, Vichy is to be preferred ; but some think that Karlsbad waters, owing to their action on the alimentary canal, are more efficacious in counteracting the tendency to the formation of gravel.

The peat baths are here, as in all the Bohemian baths, used very much, so that a portion of the good effects produced must be attributed to thermal action.

The waters of Otto's Cave at *Giesshübel*, four miles off, are acidulous and pleasant. A public conveyance plies to them. They have been long known, and are chiefly used for exportation, and that to a large extent. Karlsbad lies about 1,000 feet above the sea. It is now reached by railway from Eger.

Marienbad, if not so striking as Karlsbad, is much opener and less shut in, and it is beautifully situated in an amphitheatre of wooded hills. It is in all its arrangements the pleasantest of the quiet baths of Germany ; but owing, I suppose, to the more powerful action of its waters, the remark made respecting the sanitary improvement required at Karlsbad, is still more applicable here.

The wells of Marienbad differ from those of Karlsbad in being cold, and containing about double the quantity of purgative salts. There is little to be said specially of these waters, except that they contain more iron than those of Karlsbad, and about four times their quantity of carbonic acid, and that if not used too actively, so as to cause violent purgation, it is probable that a portion of the iron is absorbed. The *Ferdinands-brunnen*, which has lately been brought into the station, is essentially the same as the others, but has somewhat more gas and carbonate of soda, and nearly twice as much iron. There is also a very pleasant mild spring, the *Waldquelle*. The presence of iron wells without purging salts is a great convenience ; and one of these, an earthy one, the *Wiesenquelle*, has of late been found useful in urinary affections. It is said to resemble Wildungen in its action.

Peat baths form a still more essential part of treatment here than in Karlsbad, as the waters are cold.

At Marienbad all the springs are conveniently situated in one line, and a patient may walk either down below, or take moderate walks on the hills, without requiring to be able to climb, which is almost necessary at Karlsbad. On the whole I know no bath that ought to present more attractions to the English. Marienbad lies nearly 2,000 feet above the sea, and has now its own railway station.

Franzensbad lies in an ugly, uninteresting moor near the gloomy town of Eger, but everything has been done in the way of planting parks, in public institutions, and in good hotels, to make up for its natural wants. It is greatly

resorted to, and the patients, many of them chlorotic girls and pale-faced women, have a great look of business about them. They have come for cure, not for amusement. The number of English must be very small.

The waters are cold, and in strength are between those of Marienbad and Karlsbad. The constituents of the *Wiesenquelle* here, and of the Sprudel, are pretty nearly the same : but there is a good deal of carbonate of iron, with an immense supply of carbonic acid gas. Their operation is the same as that of other waters of this group. Their speciality appears to be in anæmia, and in many of the affections of women, particularly when congestion of the uterus can be combated by action on the alimentary canal.

Peat baths here, too, are in constant use. Franzensbad is now reached very easily, as it is a station on the Eger Railway.

Elster, though comparatively a small bath, has great advantages over Franzensbad in lying in a pleasant valley, 1,460 feet above the sea. It has scarcely been found out by the English yet. The Government of Saxony, or rather its king, has done a great deal for the place ; and as Saxony is not rich in mineral waters, good subjects of King John are expected to make the most of Elster. The bath establishment is good.

Although it contains one very strong sulphate of soda well, the amount of salts present on an average resembles that of Karlsbad, Franzensbad, or Marienbad ; but it is distinguished from the other group by having much stronger chalybeates.

The same effects can be produced at Marienbad, Franzensbad, and Elster, but of the three the most attractive are the first and last. There are a good many points of resemblance between Elster and Schwalbach, in their quiet hilly scenery ; Elster deserves to be more visited. The living is very moderate, and there are plenty of good lodging-houses. It is about a couple of miles from the nearest railway station. It has peat baths, and a whey cure also.

Rohitsch, not far from Cilli, in that pleasant corner of the world, Styria, deserves a passing notice, though its arrangements are still on a small scale. Its waters, well suited for dyspepsia, are drunk by some two or three thousands on the spot, and are exported largely. The place is little known to the English, but the neighbourhood is pleasant, and the climate excellent.

Tarasp, in the Lower Engadine, which may be reached either by coming down from St. Moritz, or by going up from Finstermüntz, or by going across direct from Lanquart on the railway to Chur, about 4,000 feet above the sea, has of late years been growing in importance. Its wells had indeed been known for centuries, but had not attracted sufficient attention.

Its water differs materially from the wells just mentioned, in containing nearly twice as much carbonate of soda and common salt, as it does of the purging sulphate of soda ; it has also an appreciable quantity of iron, and a vast supply of carbonic acid. Not far from it is the *Bonifacius* well, an excellent chalybeate, and further off the very pure iron *Wyh* spring. It, and also some sulphur springs in the neighbour-

hood, are scarcely utilized as yet. Near the Wyh well are some *mofettas* or gas-escapes, which kill beetles and small birds.

The waters are mainly employed for drinking, but there are also bathing arrangements. Patients begin with three glasses of 3 ozs. each, and go on gradually to six or eight glasses ; usually within half an hour of taking the last glass, the bowels are freely moved two or three times, and their operation on them is over, but there is increased secretion of urine in the afternoon and evening. Their efficacy is borne witness to by the most imposing array of *cabinets* I have seen anywhere. Tarasp, though known for many centuries, and recommended in *infarctions*, has only of late years come again into notice, so that its effects have not been sufficiently studied ; meantime its chief applications are considered to be in gall-stones, in enlarged liver and spleen, catarrh of the stomach, general obesity, besides a great many other affections, among which chronic bronchial catarrhs and laryngitis hold the first place. They consider the waters contra-indicated in tuberculosis.

Great efforts have been made to afford accommodation for visitors, and there is a handsome bath establishment, where they can reside in comfort. Those who prefer an airier situation may live at Vulpera, on the opposite bank, or at Schuls, which, however, is further off, but has a good hotel. The climate of the Lower Engadine is much milder than that of the Upper, and the whole surrounding country is on a grand scale, and in many ways interesting to naturalists. Tarasp has a great future before it, when it becomes more

accessible. But there is no prospect of any railway coming near for many a day. It is twelve hours' drive from the nearest.

Füred, a most popular Hungarian bath, much visited from Vienna, is situated beautifully on the vast and slightly saline lake, the Platten See. Its waters contain about 10.5 parts of carbonate of lime, and about 9.5 of sulphate of soda, with as much as 30.5 of carbonic acid gas; it is, therefore, difficult to say whether it should be classed among earthy, saline, or acidulous waters. Two wells are used for drinking and one for bathing. Small doses only are drunk. The baths are said to be very pleasant from the quantity of gas they contain. There is also bathing in the lake, and abundance of amusement of every kind.

These waters may be considered useful in cases where stimulation of the skin by carbonic acid is desired, and where acidulous waters with slight purgative effect are indicated, as in many cases of dyspepsia with torpor of the bowels. The season begins in May and ends in September. It is reached by boat from the railway.

Bertrich.—This quiet little spot, in a volcanic valley off the Moselle, deserves a passing notice for those who like a quiet life and moderate living, and who require little more than an indifferent kind of water. The arrangements are comfortable, though somewhat old-fashioned; the water, of the temperature of 90°, contains more salts than most indifferent springs. It is used both for drinking and for bathing, and is principally employed in affections of the nervous system, especially in women. The spring was once hotter?

CHAPTER VII.

IRON WATERS.

OF late years the prevailing medical treatment in England has been what the French call *reconstituent*, the principles of which were foreshadowed by Toinette in the “Malade Imaginaire :”—“Il faut boire votre vin pur, et pour épaisir votre sang qui est trop subtile, il faut manger de bon gros bœuf.” In such treatment iron takes a very prominent place.

Iron has long been popular as a tonic medicine. What could be more bracing than the martial preparations of steel and iron? When modern chemistry came to show that iron was actually present in the hæmatine of the blood, its use became still more extended; poor blood is caused by want of iron, and therefore can be remedied by a supply of it. Those are the obvious ideas that suggest themselves; and if such could always be carried out, there would be more of precision in medicine than we have yet arrived at. But it is not so easy always to make the system take up the substance which may seem chemically to be wanting, and iron is no

exception to the rule ; only small doses of iron are taken up by the blood—it declines to have large ones forced on it.

Iron exists in blood united with its colouring matter. It has been calculated that the blood of a healthy man contains from about 37 to 47 grains of it ; iron is also found in other parts of the body, as in the muscles, and especially in the hair and in the spleen. It occurs in minute quantities in some of the secretions, including those of the alimentary canal. It has been reckoned that there are about 70 grains of iron in the system, and that about one grain passes out and is taken in daily. Iron is introduced into the system in articles of diet, and the proportion taken up depends mainly on the activity of the nutritive process ; hence arises one of the questions regarding its administration, already hinted at, when noticing salt springs, whether in a particular case it is better to present iron directly to the stomach, or to endeavour to place the system in a condition favourable to its taking up iron from the food.

The exact use of iron in the system is only partially known, although its presence appears to be essential to the formation of blood-globules. We know indeed that poverty of iron in the blood may be induced by excessive loss of the circulating fluid, or by continued suppuration or other discharges, and that there is a want of iron in the blood of girls suffering under that disease of imperfect development, chlorosis.

A great deal of the iron which is exhibited medicinally is not absorbed, but passes off chiefly in the form of sulphates. Strong doses, especially of the sulphates, are difficult of

digestion, and thus some of the strongest chalybeate springs, for instance some English and Scotch ones—as Sandrock in the Isle of Wight, and Hartfell—are practically useless. The oxides appear to be dissolved by the gastric juice, and the presence of albumen and of phosphated alkalies favours solution ; but even when introduced in a soluble state, iron is taken up very slowly. It seems to be taken up chiefly by the blood, not by the lymphatics. Part goes to the blood-corpuscles, part to the secretions and other parts of the system, especially the hair. Iron passes readily into the water, when more has been absorbed than is wanted by the system ; it has also been found in the perspiration and in bile.

But a small quantity of iron appears ever to be absorbed ; it has been calculated that chlorotic patients have taken up 4 to 5 grains of the lactate daily, or scarcely one grain of metallic iron.

As to the physiological effects of iron when it is absorbed, it seems to make the pulse somewhat slower, and to have a contractile effect on the capillaries, and undoubtedly to cause a great increase of the blood-corpuscles ; it is probable that it favours oxidation and the production of heat. Its continued use is said to lead to congestions, at the same time that its external and local application is strongly styptic, and its internal use often stops hæmorrhages and other discharges. It has a tendency to produce headache in some persons. If presented in an unsuitable way to the stomach, it often interferes with healthy digestion ; on the whole it is constipating to people in health ; but some of

its salts may cause diarrhœa in irritable states of the alimentary canal.

The medical uses of iron may be classified—first, according to its contractile action ; secondly, its general constitutional effects. In the first case it may be useful in chronic *diarrhœas* and in atonic *bronchial* secretions ; it is much used in excessive secretion of the *genito-urinary* organs. It is also, by its contractile power on the blood-vessels, that its undoubted efficacy in spleen is supposed by many to be exercised. But its far more important effects, and those having most analogy with the effect of mineral waters, are its general and constitutional ones.

Iron is of great service in cases of what may be called *atrophy of the blood*, want of red corpuscles and relative wateriness, whether the result of great losses by bleeding, suppuration, acute illnesses, or of a more gradual deterioration of system. The first class of cases improves very rapidly under iron ; the other general cachexy cannot be so rapidly removed. One of the most marked forms is the malarious one with enlarged *spleen*, not uncommon in Europe, but commoner in tropical countries ; such general conditions, where the liver and alimentary canal are in fair working order, may profit much by iron. Iron is the great remedy for spleen—it has also been said to cure intermittent fever ; and Pyrmont and some other spas are reported to have extinguished obstinate agues.

But the disease of all others in which iron is considered the remedy, is *chlorosis* ; and in it, especially when combined with the stimulating effects of carbonic acid, it is

most efficacious. It is scarcely necessary to define chlorosis; the pale, sallow, bloodless look of some growing girls is familiar to all, and is to be cured by a combination of nourishment, exercise, and iron, with in some cases, when the bowels are sluggish, the addition of aperients: it is in these last cases that the waters of Homburg and Franzensbad or Elster are preferable to simple chalybeates, when it is desirable to act a little on the bowels. There is a somewhat similar condition in young men, accompanied with want of power, and in it also iron is one of our best remedies. It has been ingeniously calculated that for the cure of a case of chlorosis about twenty-two to forty-four grains of metallic iron are required, and a cure by mineral waters may be expected to extend over from four to six weeks.

There are very few iron waters, indeed, in which the patient is able to take one grain of iron daily.

Other classes of disease, such as *neuralgias*, *hyperæsthesias*, *impotence* and *sterility*, have often come under treatment by iron; but in such cases, especially in the two last, what benefit may be expected from iron waters is referable, not to any specific action, but to their general effect on the system.

The old idea that iron waters were *solvents of stone* is now given up, but it partially survives in the use of iron waters like Wildungen, in which the alkalies combined with iron are doubtless useful in catarrh of the bladder.

Iron waters, especially the highly carbonated ones, must be given with caution to those who are advanced in years, and very carefully indeed to those who are predisposed to

hæmorrhages of any kind. They are to be avoided by excitable and full-blooded persons. Their internal use is more dangerous than their external.

Every water that deposits a yellowish rust has been set down as a chalybeate, and the number of such springs in almost every country is infinite ; not so the number of really powerful waters. The latter are very abundant in Northern Germany, scarce in England and in France. Italy has a few, and Spain appears to have some that enjoy considerable repute.

Iron occurs in waters mainly in the shape of carbonates, the most convenient form for its assimilation. Sulphates, and still more chlorides, are uncommon, and iron rarely occurs in a water except with other salts. In all the popular spas there is an abundant supply of carbonic acid, which makes these wells palatable ; in the simple ones the iron is often combined with crenic or humic acids ; but besides carbonic acid other substances are often present, and waters have been classified, according as various substances predominate. For practical purposes they have been divided into tolerably pure, common salt, and complicated ones : the last, besides some carbonate of soda, may contain Glauber salts, carbonate of magnesia or of lime, sulphate of magnesia or gypsum. My table shows their relative purity.

A great many alkaline springs contain a good deal of iron. For instance, Vals, .2 ; Wildungen, .2 ; Heilbrunnen, .22 ; St. Alban, .23 ; Châteauneuf, .34 ; Chateldon, .35 ; Giesshübel, .45. Many salt springs too, as Soden, .15 ; Homburg, .23 ; Kissingen, .31.

Many of the alkaline purgatives have a large supply, as Marienbad, .61 ; Elster, .45 ; Tarasp, .18.

Many chalybeate waters are, as appears from the following table, more than 900 feet above the sea, an elevation which adds very materially to their effect. They vary in temperature from 39° to 62° or 63°. Few are of higher temperature, and thermal waters as a rule do not contain much iron. Some earthy ones, as Bath, Bagnères de Bigorres, and Leuk, contain a little.

St. Moritz	5,464	Griesbach	1,614
St. Catharine	5,304	Elster	1,465
St. Bernardhin	5,005	Recoaro	1,463
Tarasp	4,000	Alexisbad	1,350
Königswart	2,000	Petersthal	1,333
Pejo	1,900	Franzensbad	1,293
Rippoldsau	1,886	Spa	1,000
Bagnères de Bigorres	1,850	Schwalbach	900
Rabbi	1,800	Driburg	633
Reinerz	1,668	Bocklet	620

TABLE OF AMOUNT OF IRON IN SOME SPRINGS.

	MINERAL CONSTITUENTS.	CARBONATE OF IRON.	CARBONIC ACID.
Tunbridge	1.3	.6	2
Wildungen, S.	3.1	.35	24.8
St. Catharine	3.5	.54	a good deal
St. Bernardhin	3.3	1.5	ditto
Schwalbach, S.	4.3	.598	53.5
Alexisbad, A.	4.3	.32	..
Spa, P.	5.7	.497	17?
Pejo	7	1.2	23?
La Bauche	7.2	1.7	..
Neuhain, Soden	8	.48	40?
Königswart	8.1	.72	27?
Orezza	8.4	1.2	36?
Malmcdy	12.6	.48	25.5
Wyh	12.8	.25	41

	MINERAL CONSTITUENTS.	CARBONATE OF IRON.	CARBON ACID.
Liebenstein	13.9	.56	23.0
St. Moritz, A.	14.4	.24	30.2
Bussang	14.8	.17	14?
Rabbi	16.6	1.19	22
Reinerz, L. Q.	17.3	.38	27.7
Elster, M.	20.9	.62	25
Tonnistein	19	5—3.6	31?
Marienbad, K. R.	21.5	.42	12
Pyrmont	23.4	.56	27.6
Griesbach, T.	26.4	.56	29.4
Rippoldsau, J.	30.1	.37	24.5
Driburg, T.	31.7	.54	29.2
Bocklet	32	.79	29.8
Recoaro	32	.45	21?
Tarasp, V. Z.	36.5	.33	37.2
Homburg, L.	40	.47	41

Perhaps no bath in Europe has kept up its reputation more steadily than *Spa*, and it has everything to justify this: good waters, agreeable country, excellent arrangements, and plenty of amusement, a shady promenade, and wooded hills all round. It is also of all baths the one most easily reached from England.

Only one of the four or five public springs is in *Spa* itself; the others are at considerable distances in the woods. Some of the waters have a slight smell of sulphuretted hydrogen. They vary much in strength from the weaker ones, the *Barisart* and *Geronstere*, to the strongest, the *Pouhon*. Probably the private source of the *Condés* is the strongest. But even the recent analysis of the waters of *Spa* is not quite satisfactory. The water is very easily borne by most stomachs, and the quantity is from two to four glasses. It has been more used for baths of late years than formerly,

and there is a magnificent bath-house. When baths are used, the higher temperatures are not recommended. Peat baths are to be had here, and chemical analysis has of course discovered that the peat soil of Spa contains particularly valuable principles.

The waters of Spa are adapted most for anæmic and cachectic conditions of the system. Chlorosis and many affections of the female system find relief here ; in short, almost all the cases in which iron waters are indicated may be treated at Spa. The waters are not quite so strong as those of Schwalbach, but the general indications for the use of both are the same. Schwalbach has the advantage of stimulating the cutaneous surfaces more by its baths.

The country around Spa is pretty, and there is no station where riding on horseback is so much practised. To the older arrangements of this long-established spa a very complete *Kurhaus* has of late years been added. Living is not dear. The abolishment of gambling is a gain to families.

The old village of *Malmédy*, two or three hours' drive from Spa, and inside the German frontier, contains several excellent iron wells. The place was fully described by our countryman Lucas more than a century ago ; it is now proposed to bring the wells into notice again. They will do very well for those who desire a quieter place than Spa.

Pyrmont, though with much to render it attractive, has till lately rather gone down in the world ; but it lies in a beautiful valley, has excellent arrangements of all kinds, drinking wells and baths, a magnificent avenue, and a very fine park. It has very good lodgings, and fair hotels.

There is an immense supply of carbonic acid in these springs, and some of them are said to have the stimulating effects of champagne. The Helenen is particularly agreeable to the taste. Patients begin with small quantities, two or three half or full glasses, and then go on gradually to six or eight.

The baths here are particularly well managed, few of the class elsewhere having such an ample supply of water.

Poverty of blood, hysteria, slow convalescence, hypochondriasis, are among the maladies likely to profit by Pyrmont, and the strong brine spring and salt drinking well vary the resources of the place. Especial attention is paid to the diseases of women, which are treated very successfully here, and the baths have been thought useful in chronic diarrhœa. Pyrmont is only 400 feet above the sea, and cannot boast of an Alpine climate, one of the most important adjuncts of some of the chalybeates now enjoying the greatest popularity. Nevertheless, and though it does not compete in its social arrangements with some of the most fashionable baths, it deserves more attention from the English, and will receive it when the railway, now open a great portion of the way, shall have reached it. Its tables are of course gone.

Alexisbad lies in the romantic Selke valley in the Hartz, about 1,400 feet above the sea. It has two iron wells: one the *Selkebrunnen*, said to contain chloride of iron, used almost entirely for bathing; the other the *Alexisbrunnen*, for drinking. Its artificially heated baths have gained a considerable reputation, especially in some of the affections of women connected with a relaxed state of the system, but

it has no special virtues in this way ; though popular in the north of Germany, this bath is little known to the English. It has pine-extract baths, and a hydropathic establishment. It is two to three hours' drive from the railway station of Quedlinburg.

Driburg, in a pretty valley in Westphalia, has long been popular among the Germans, though not much visited by the English. It has large establishments, which are usually crowded with guests, especially with ladies. It is nearly 700 feet above the sea, and the air is counted pure and invigorating ; three to eight glasses is the quantity usually drunk. Iron and mud baths are also much used. An omnibus goes from the railway station to it in five minutes.

Liebenstein is a quiet little place in Saxe-Meiningen, and possesses a powerful spring ; it is more than 900 feet above the sea. It has got a whey cure, a hydropathic establishment, and salt baths, and is in favour with the Northern Germans as a healthy place, where living is cheap. New hotels and villas are springing up every day. A pretty spot like this in the Thuringian Forest ought to suit many English people. It is less than an hour from the railway at Salzungen, itself a salt bath.

Wildungen is a three-hours' drive from Wabern on the Cassel railway. It used to be well known for its second-rate gaming tables, now closed.

It is an open airy place, with greensward and some fine patches of wood. Its wells are unfortunately scattered like those of Spa : two of them each a mile or more off in narrow ravines. These waters have usually been considered earthy

carbonated ones, but they contain enough of iron to justify their being classed here.

There are many springs; the three chief are—the *Stadtbrunnen*, used for the establishment. It contains carbonate of magnesia about 3.5, ditto of lime 4.9, carbonate of iron .15. It is used in drinking and in baths, and is in great repute for affections of the bladder and kidneys. The *Helenen* or *Salzbrunnen* contains about 9 parts of carbonate of soda, 13 of carbonate of magnesia, and as much iron as the last. It resembles one of the wells in the Brohl valley. The *Stahlbrunnen* is one of the best pure chalybeates in Europe. It has only 3.1 of solid constituents; of these .55 are carbonate of iron. All the waters of Wildungen are extremely pleasant to drink, owing to the large quantity of carbonic acid which they contain, and are in consequence largely exported.

I found it difficult to form a positive opinion as to the real value of the waters of Wildungen in the catarrhs of the bladder and urinary affections, for which it is usually visited; but there can be no doubt that its excellent chalybeates must be useful in many of the cases in which iron is indicated. The *Kurhaus*, with nice grounds near it and a shady avenue, lies rather low. There are comfortable hotels. The visitors are often from very remote quarters of the globe. The English are not numerous. There are no fewer than six doctors during the season.

Königswart, about six miles from Marienbad, and at a height of 2,000 feet, has powerful iron wells with a good supply of carbonic acid, and has baths. It is

worth the attention of those who visit the other Bohemian spas.

Reinerz, near Glatz in Silesia, lies in a pleasant valley at a height of 1,785 feet. It has five alkaline earthy wells, also iron baths, mud baths, and a whey cure ; it has been called the Silesian Schwalbach. The climate is mild, and living very cheap. Reinerz has the credit of being particularly useful in cases of mucous bronchial catarrh, and the lukewarm temperature of one of its wells is believed to contribute to this. Persons afflicted with torpid tuberculosis may spend the summer months here.

Brückenau.—It is a great pity that this secluded village, lying among hills covered with luxuriant forests of beech, and with admirable bath arrangements, cannot boast of a stronger well—its own not containing quite $\frac{1}{10}$ gr. of iron in the pint. There are, however, some very pleasant acidulous springs useful in dyspepsia, and the turf baths are in full force. It is some hours' drive from Kissingen, and from the nearest railway station. This pretty spot was the favourite bath of the late King Louis of Bavaria, who built a handsome *Kurhaus*. The living is simple, but comfortable, and very cheap.

Bocklet stands in strong contrast to Brückenau, not with the same natural and acquired advantages, although a pleasant enough place, but with a far more powerful, though not so pure a well. It is a disadvantage to Bocklet that it is so close to Kissingen. Its waters come very well after a course of Kissingen, and there are carbonic acid douches for such as want them ; but visitors usually prefer

a greater change than the mere move of some four or five miles up the same valley. However, Kissingen is often so overcrowded, that many patients are obliged to resort to Bocklet.

Schwalbach is at present perhaps the most popular chalybeate in Europe, and with very good reason. Within the last two or three years very considerable improvements have been made in the bathing and in the drinking arrangements. The *Stahlbrunnen* has been excavated afresh, and the *Weinbrunnen* is one of the best known springs in Europe. The waters have a good supply of iron, and a most abundant one of carbonic acid; and the presence of carbonic acid in considerable quantities has been secured for baths. By good arrangements only a small portion of the carbonic acid is lost in the process of heating, so that the *Schwalbach* baths decidedly stimulate the skin, and are much liked by patients. Everything that has been said of the effects of iron applies to *Schwalbach*, and there are few wells which answer in their effects to one's expectations better than these. Perhaps its effects are most marked in chlorosis, neuralgia, hysteria, hysterical paralysis, in convalescence from exhausting diseases, from bad confinement or typhus.

Schwalbach is placed most conveniently as an after-cure, after Homburg, Wiesbaden, Ems, and many other places.

Schwalbach lies in a narrow valley surrounded by wooded hills, in which there are pleasant walks. But there is a want of public gardens sufficiently large for the recreation of the immense crowd of visitors, and there is, to me, a

sort of cramped feeling about it. The living too is on the whole not equal to what it is in many other places. The place is at times intensely hot when it is dry, and then very raw when it is wet. The drive to Schlangenbad is pleasant, and that place might be made more use of as a change than it is. English and Americans and other foreigners here greatly predominate in numbers over the Germans. It is reached by carriage in three hours from Wiesbaden, or from Eltville on the Rhine railway.

The Black Forest offers three principal iron springs. They are readily reached by coach from Appenweiler, on the Baden railway. The amount of iron and of mineral constituents which they contain, is nearly identical. Their special character is found in their containing some sulphate of soda. They have a large supply of carbonic acid.

First comes *Petersthal*, at a height of 1,333 feet, with the adjoining group of chalybeates at *Freiersbach*. It is a very pretty station, with new and comfortable arrangements of all kinds, and considerable variety in its waters. Of late years it has been very popular and crowded.

Proceeding up the valley one comes on *Griesbach*, at a height of 1,614 feet, a very picturesque little place, to which a new bath has been lately added. It is very quiet, but usually full to overflowing; it is a favourite lady's bath. There are pine baths and inhalation-rooms.

Ascending the Kniebis by a zigzag road, one comes down on *Rippoldsau*, at the height of 1,866 feet. It lies in a narrow valley, encircled by woods covered with pine forests, through which there are beautiful walks. The air is fresh,

and I found it almost chilly about the middle of September, when the season was just over. The establishments here are on a large scale, and very conveniently grouped together. Drinking, bathing, and pine baths are all employed. These waters produce, in a milder degree, the same effects as those of Marienbad and the Bohemian group of baths. Besides being useful, like waters of the class, in chlorosis and other affections of women, they are employed in congestions of the abdominal organs and in hyperæmia of the liver. When the waters of Rippoldsau do not act on the intestinal canal, they are supplemented by the Natroine water, which is prepared both here and at Petersthal, and which contains a double salt of carbonate and of sulphate of soda, in imitation of the Kreuzbrunnen of Marienbad.

The air of quiet and repose which prevails, and the beauty of the wooded hills, strongly recommend these baths to those who like to resort to the quieter ones, and desire a sub-Alpine climate.

St. Moritz, the most popular bath in Europe with the English at this moment, owes more to its elevated site and to the quantity of carbonic acid its waters contain, than to their very moderate amount of iron. *St. Moritz* is high enough to make the effects of its rarefied and usually dry air felt by all, and especially by those who are of nervous organization. In old days this bath was in great repute, and it has grown into renewed notice with great rapidity.

The mineral wells rise in a low meadow, somewhat marshy, where is situated the great establishment containing the baths, drinking wells, and lodgings for the guests.

The waters are used for drinking ; they are also heated for baths, and the carbonic acid gas is used for inhalations and local douches. Paracelsus wrote, that "whoever drinks of these waters according to the rules of science, will be able to boast of real soundness of health. They cure tartar (dyspepsia), gravel, gout, rheumatism, for by their use the stomach is so strengthened that in the end it can digest anything, as the ostrich does iron or a blackbird pebbles." The Abbé de Burgo tells us that the waters are sovereign in spleen, and, curiously enough with reference to some modern views, in hæmoptysis also. But then he ordered the waters to be drunk in quantities that would create astonishment now—20 to 30 up to 100 and even 200 ozs. a day ; and this assisted by the chewing of anise and by dry cupping to the stomach. As might be expected, waters slightly chalybeate, and with abundance of carbonic acid gas, and therefore pleasant to drink and to bathe in, and having none of the after-effects of most medicines, are universally popular, and, in conjunction with the influence of the Alpine climate, are applicable to a variety of general conditions of debility and relaxation, among which chlorosis and anæmia, some neuralgias and nervous affections, are pre-eminent. Practically the effects appear to be mainly those produced by a mountain climate, and such as are looked for in India from a visit to hill-stations.

Excursions of the most varied kinds can be taken, and in fine weather the place is delightful and the climate is quite exhilarating ; but it must be recollected that the season is not a long one, and that although people, in spite of

scanty supplies, are now wintering there for consumption, the saying of the country is, "Engadina terra fina, si non fosse la pruina." When there is difficulty in getting rooms at St. Moritz, it is best to push on to Silva Plana, Samaden, or other villages with very fair inns, and particularly to Pontresina, and wait till you get rooms ; you have all the advantage of the mountain climate there, and at some of them have much finer scenery than at St. Moritz, especially at Pontresina or at Silva Plana. The living at St. Moritz is indifferent.

Before leaving St. Moritz, I may observe that Paracelsus is correctly quoted as saying that St. Moritz in the Grisons has the best well in Europe ; but that the further statement, that its virtues are most powerful in the month of August, has arisen from a mistranslation of the word *Augustior*. He also says that the spring owes part of its virtues to the waters having passed through many cataracts. The excellence of the whisky produced at a celebrated distillery in Scotland has been attributed to a similar cause !

It still takes about eleven hours to reach St. Moritz by diligence from Chur on the railway.

San Bernardhin lies on the southern side of the Bernardhin mountains on the road from Splügen to Bellinzona. It is 5,005 feet above the sea. It has very excellent and powerful carbonated waters, containing with a little sulphate of magnesia perhaps too large a quantity of lime. There is no establishment, but there are excellent hotels, resorted to chiefly by Italians. The waters are only drunk. Life there is very quiet, the scenery magnificent and wooded.

Santa Caterina, in a wooded valley, about three hours' drive from Bormio, has a purer but not so powerful a spring as the last. There is a small establishment which contains 120 beds. The place is 5,304 feet above the sea, the temperature is low, and the climate uncertain. Nevertheless during the summer months it may often make a useful change from Bormio. Life is dull, almost monastic.

Pejo, in the Trent district, has one of the purest and best chalybeates in Europe, with plenty of carbonic acid. It is at a height of 1,900 feet. The waters are only used for drinking, and they are exported. *Pejo* is comparatively a rustic place, but has 400 or 500 Italian visitors annually.

Rabbi, like *Pejo*, within the Tyrol frontier, is reached by a drive of six hours from the station of San Michele on the Brenner railway. It appears to be only about 1,800 feet above the sea, though some put it at the much greater height of 3,891. The water is in great abundance, and is used chiefly for drinking, but there is a spacious casino in which there is every variety of baths and douches.

There are several hotels here, and living is very fairly comfortable. Some English have found their way hither, and more will probably do so, when the excellence of the waters is more extensively known. *Rabbi* is in the centre of mountains, and many excursions can be made from it. Its waters are very largely exported.

Recoaro is reached by diligence from Vicenza in about four hours. It is situated on the Prekeli, in a fine valley shut in by magnificent dolomite mountains. It is about 1,500 feet above the sea. The arrangements of the place

are excellent, and living is moderate. The place is high enough to escape to a considerable extent the heat of an Italian summer. Altogether, there is scarcely any other steel spring with a considerable amount of iron, that offers so many attractions to residents in Italy. The waters are not so pure as those of Rabbi, but it is a livelier place.

I shall only mention one Spanish chalybeate.

Sta. Agueda, about twelve miles from Alzola, and one of the group of northern Spanish baths near San Sebastian, besides its sulphur springs has a ferruginous spring, of which Rubio says, that it has a considerable quantity of iron and a very small quantity of earthy constituents in it; it is much resorted to by the Spaniards as a strong tonic.

This is a fashionable bathing-place, and in a beautiful country; a correspondent writes that "English might be fastidious about the accommodation, but the climate is so fine that one is always out of doors; indeed, rooms more furnished would be stuffy; at that season food is always abundant, and to my taste good." Some years ago a Frenchman wrote: "If you take vapour-baths here, you will get ones at least as good as any to be had in Paris. Only they will cost you much less, and possibly do you more good, thanks to the cleanliness which reigns in the comfortable establishment." The whole neighbourhood offers much of interest to the botanist and the geologist.

France is not rich in desirable chalybeates.

Orezza, in the island of Corsica, is by far the best French chalybeate. But for its insular position it might well compare with any spa in Europe. It is comparatively pure, has

a large quantity of carbonate of iron, and an abundant supply of carbonic acid. It is in a beautiful country, amidst mountains and forests. It is in great repute locally in cases in which iron is indicated, especially in chlorosis and some of the complaints of women, and is said to be a specific in malarious poisoning, which is common in many parts of Corsica, but only when it has not gone the length of producing engorgement of the liver or spleen. Its waters are largely exported. The season is short—from the middle of June to the 30th of August. There is no establishment, but there are lodgings in the neighbourhood.

Of late years a pure and powerful well, but without any carbonic acid, has been discovered at *La Bauche*, near Les Echelles, not far from Chambéry. It is in a pleasant part of Savoy, 1,500 feet above the sea. The French are very anxious to bring this spring into favour, and it has been provided with a small establishment. The water is also exported, and keeps well.

Forges les Eaux, department of the Lower Seine, with a fair chalybeate, enjoys a reputation in chlorosis, the effects of hæmorrhage, in dyspepsia, and in some diarrhœas; also in sterility, as having contributed to the birth of the Grand Monarque! The French say it is dull, and the only distraction is the promenade. The establishment is in a well-wooded but rather damp park. Forges is on the railway.

Bussang, in a pretty situation in the Vosges country, close to the source of the Moselle, is a pleasant weak acidulous chalybeate. Its waters are largely exported, but not drunk on the spot; it is chiefly used as a table-drink. There is no

drinking establishment, and a visit to Bussang merely makes a pleasant excursion for visitors at Plombières Bains, or other baths in the Vosges country.

Nor has England much to boast of in the way of chalybeates. It abounds indeed in ordinary chalybeates, but none contain much carbonic acid. Some of those near the sea, as the one recently brought into use at *Hastings*, deserve some attention.

Tunbridge Wells is almost the only source of the kind it possesses, and the quantity of iron is fair, and there is little gas. Still it is a very pure chalybeate. At one time the waters were in great fashion; now they have fallen undeservedly into neglect; but the place will always be popular owing to its bracing climate and the very pretty country in its vicinity. Those who go to Tunbridge Wells, and are likely to benefit by chalybeates, ought certainly to give the wells a trial.

Perhaps I ought not entirely to omit mention of a stronger class of waters, which are found to be too strong to be conveniently used for drinking—those of *Arapatak*, scarcely yet known, containing in its two fountains 2 to 3 parts of the carbonate of iron. Also the iron spring at *Wassenach* near Tönnistein in the Brohl valley, with 4 parts. Better known in England is *Dr. Muspratt's* chalybeate at Harrogate, said to contain as much as 1.45 of carbonate, and 1.8 of chloride of iron in the pint, but along with 55 grs. of other salts. The value of this water, at once a powerful tonic and a laxative, is undoubtedly great. It is given in doses from 2 to 6 ozs. three times daily; but it is worth while to observe the qualification, “that the water must be given with much

circumspection, as it frequently proves not only most difficult of digestion, but is apt to cause several of the most painful physiological effects common to pharmaceutical preparations of iron ;" while the same writer finds the greatest improvement traceable to the action of steel from the use of the weak *Tewitt* chalybeate. This affords clear confirmation of what has already been said, that the system only takes up a certain amount of iron. The stronger water at *Alexisbad* is only used for baths.

Sulphated Waters.—Waters with the sulphate of iron, if they are at all strong, are too disagreeable for the stomach to bear, and therefore of very little use, especially when alum also is present. To the wells of this kind belong *Mitterbad* and *Ratzes* in the Tyrol, both greatly frequented by natives of the country and by Italians ; also the waters of *Levico* near Trent, though it has a milder drinking spring. The Italians have many sulphated waters, as those of *Rio* in Elba ; the *Pisciarelli* near Puteoli, described by Pliny, of a temperature of 157°, and containing much alum, is still in favour in Naples as an external application. *Auteuil* and *Passy* are now included in Paris. The Passy waters are not much drunk, and the Auteuil ones are chiefly exported. They contain sulphates of iron and of lime, and some hydro-sulphuric acid, and are counted a powerful tonic ; but both are now neglected.

Under this head come the strong waters of *Sandrock*, Isle of Wight, containing much alum ; *Vicars Bridge*, near Dollar ; and *Hartfell*, near Moffatt, besides many in Italy. At times the use of these waters has been recommended, but

it has always been difficult to get patients to drink them, and they are very little used now.

Some few do, however, assign a certain value to these waters when employed as baths. They think that they exercise an astringent and tonic action on the skin. The waters of Mitterbad, Ratzes, and Levico are used in this way; so also the waters of *Muscau* in Northern Prussia, containing 8 or 9 parts of sulphate of iron, where there are large establishments and a fine park. The strong waters of the new spa near *Trefriw*, in North Wales, appear to be occasionally used in this way.

The water of Levico has recently been employed in *subcutaneous injections* in some cases of skin disease, with alleged good effects.

CHAPTER VIII.

ON THE PRESENCE OF MINUTE QUANTITIES OF SALTS
AND OF CARBONIC ACID IN SPRINGS, AND ON ARTI-
FICIAL WATERS.

FOR convenience sake I have thrown together into one chapter the few remarks which I have to make on some other varieties of waters.

Many of the salt waters that have been above enumerated, contain traces of *iodine* and *bromine*; some of them have very appreciable quantities of them, and special effects of a very important kind have been attributed to them. It is hardly necessary to say that they are both very powerful medicines, both very active in promoting absorption (although much is not practically known of bromine in this respect), both, particularly the bromine, producing very marked effects on the central nervous system, and one certainly, when given in large doses, often producing the disagreeable symptoms of iodism, in many respects analogous to those of mercury; suffice it to say, that those powerful effects are produced by large doses, that iodide of potassium is administered in doses of from 8 to 60 grs.

daily, and that it is only since bromide of potass has been used in still larger doses, that its remarkable properties, making it for the moment (1869) almost a panacea, have been discovered. It may be recollected, on the other hand, that it is doubtful whether any waters contain more than a $\frac{1}{10000}$ part of iodine, and that few waters contain more than a $\frac{1}{10000}$ part of bromine.

Some of the salt waters that have been believed to produce all the effects of iodine, are those of whose essential constituents the following table gives an idea. The iodine and bromine are chiefly combined with soda and magnesia.

	SOLID CONSTITUENTS.	BROMIDES.	IODIDES.
Krankenheil	5.8 . . . .	. . . . .	.01
Saxon	7.3 . . . .	.4	1.1
Challes	8.4 . . . .	.1 . . . .	.109
Adelheid's Quelle	60 . . . .	.37 . . . .	.24
Münster am Stein	87.5 . . . .	.75 . . . .	..
Kreuznach	{ 122.2 . . . .	.39 . . . .	.047
	{ 169.3	2.1 . . . .	.016
Hall	130 . . . .	.50 . . . .	.3
Castrocaro	293	1.1	1.9?
Wildegge	143 . . . .	.10 . . . .	.24
Elmen	292	2.1 . . . .	..
Woodhall Spa	279 . . . .	.79 . . . .	.42

Granting that the bromides and iodides may be present in all of these waters in the quantities stated, it is evident that only the first three are sufficiently pure, to make it possible to exhibit them without a large quantity of other salts. Take the case of *Woodhall Spa*. Children are ordered 1 to 2 ozs. of the water, adults 4 ozs., three times daily. In this case the children cannot receive more than a quarter of a grain of the two salts combined, and an adult not more than three-

quarters. But in practical medicine we have no knowledge of the operation of such small quantities. We therefore are thrown back on the chloride of sodium, which is the chief constituent of these waters, and we find that at *Krankenheil*, where there is not much salt in the spring, salt is added to the iodine water to increase its efficacy.

Notwithstanding stories, to which it is impossible to attach credit, of iodism being induced by the use of such waters, it has been found at the *Adelheid's Quelle* that 54 to 72 ozs. may be drunk daily for six weeks without any perceptible effect being produced, and a child between five and nine years may take a quart daily for any length of time. As to the *Wildegge* water, which is of about half the strength in iodides of Woodhall Spa, for a long time they did not venture to go beyond teaspoonful doses to children; even now they say that young people should not take more than two or three glasses daily, but practically it is at present considered valuable, merely as being a good vehicle for administering iodide of potass in!

As for the iodine waters of *Saxon* in Switzerland, which have of late years attracted attention, owing to the varying though really unusual amount of iodine they contain, and the curious fact, which is apparently ascertained, that the rocks near the springs emit a distinct smell of iodine, one is sorry to think, that they have often been tampered with, and that artificially impregnated waters have been palmed off on the public for real ones.

On the whole therefore, and as in every instance those small quantities of iodides or bromides are associated in

mineral waters with large quantities of common salt, we are not warranted in assuming that any effects are produced by them, which may not be ascribed to the employment of the latter substance. Medical men are apt to glance their eyes over tables of the constituents of mineral waters, and if they observe even traces of bromides or iodides, they readily believe that those substances are present in medicinal quantities.

This may be a convenient place for noticing shortly some of the other infinitesimal constituents of mineral waters.

Much importance was attributed some years ago to the discovery of *arsenic* in many of the mineral waters, although they seldom contain more than the two-millionth by weight part of metallic arsenic, and it is quite uncertain whether then it exists as an arseniate of soda, as is commonly assumed, or is combined with iron; and special effects were attributed to its presence. Arsenic is, however, now known to be a constituent of so many waters, of many excellent drinking ones, and it has always been found in such small quantities, that people have ceased to think much of it. Not so the French, who attach much importance to it. They find the following quantities of arseniate of soda in some of their springs :—

Bourboule . . . . .	.14
Vichy . . . . .	.03
Bussang . . . . .	.02
Bigorres . . . . .	.013
Mont Dore . . . . .	.009
Plombières . . . . .	.006

La Bourboule at present enjoys an immense reputation on the score of the amount of arsenic it is believed to contain.

It should be recollected, that one cannot administer in these waters the .14 part of arseniate of soda without 6.66 parts of other solids ; that the usual dose of that salt is from .035 to .07 ; that Vichy contains scarcely one-quarter of what Bourboule does ; and that although the latter water appears to contain arsenic in medicinal proportions, yet it is certain that five or six pints of it may be drunk without producing any effect that can be referred to its arsenic. That substance can scarcely be regarded as a therapeutic agent in mineral waters.

The discovery of *lithium* again in some waters (exceptionally of 0.5 of a grain in the 16 ozs. in a well at Elster, and in the *Murquelle* of as much as 2.36) seemed to promise something in the treatment of gouty forms of disease. But although Bence Jones showed the immense rapidity of the passage of lithium into the circulation, and of its reaching the joints, the hair, and even the lens of the eye, little is known of its use in medicine, but that it dissolves lithates. The dose for an adult is set down as 3 to 6 grains of carbonate of lithium thrice daily, certainly not less than 12 grains a day, so that the minimum dose of the *Murquelle* would be over five pints, which would contain more than half an ounce of other salts, and that of the next strongest well would be twenty-four pints daily. Much therefore can scarcely be expected from the *Sources à Lithion* at Baden-Baden.

Some years ago a salt thermal spring in the bottom of a mine at *Redruth*,¹ in Cornwall, was discovered to contain at least four times as much lithium as the *Mur* well. But

¹ The only English bath referred to in Meyer's excellent "Index Guide to the Wells of Europe" is that of Redzette !

owing to the quantity of common salt, and to its deep situation, its waters could never have been utilized : they are now lost. A new spring of the same nature, lately discovered in Huet Seton Copper Mine, in Cornwall, can be of no real medical importance.

Of the operation of minute quantities of *copper*, of *strontium*, of *barium*, or of *rubidium*, absolutely nothing is known. *Boracic acid* is believed to be a solvent of calculi, but it has never been detected in wells, except in very minute quantities.

As to the effects of *manganese*, which occurs in the fluids of the body, and in very trifling quantities in some mineral waters, this metal, when used medicinally, has been considered a tonic, and analogous in its effects to iron. But the chief mineral waters containing any considerable amount of manganese, are those of *Cransac*, *Luxueil*, *Crol*, and *Schwalbach*.

Some writers attach importance to the presence of *silicic acid* in waters, and French writers in particular to the presence of silicates in some of the Pyrenean sources, but nothing in reality is known of its operation on the system. It is so difficult to tell, why the weakly mineralized waters of the Pyrenees exert on the system an influence beyond the ordinary thermal action of water, that extravagant importance has been attached to the presence of small quantities of sulphurets and of silicates in them.

The waters in which *carbonic acid* is combined with salts in considerable quantities have been already noticed under their several heads ; and as the more feebly mineralized ones are chiefly used for the table and for exportation, it may be

sufficient merely to enumerate some of them. As a general rule it may be said, that 6 to 10 inches of carbonic acid in the 16 ozs. of water, is quite sufficient to make it agreeable ; quantities over 25 inches are in excess of what is wanted.

These table waters may perhaps be divided, into those in which carbonate of soda and chloride of sodium predominate, and into those which contain lime or magnesia ; there are often minute quantities of iron and of other salts also present.

The first are chiefly German ; they are very abundant in the Rhine country or near it, as *Seltzers*, *Heppingen*, *Roisdorf*, *Tönnistein*, *Apollinarisberg*, *Schwalheim*, also at many other places, such as *Kissingen*, *Brückenau*, *Giesshübel*, and *Soultzmatt*.

Italy has many such waters, among which the *Aqua Acetosa* of Rome may be mentioned.

The second are chiefly French, as *St. Alban*, *St. Galmier*, *Chateldon*, *Condillac*, *Renaizon*, and *Pougues*.

Artificial Salts.—These are prepared from the waters of many places, as Vichy, Vals, Karlsbad, Marienbad, and Cheltenham. Imitations are also prepared.

Artificial Waters.—When Bacon expressed surprise that “no man hath sought to make an imitation by art of natural baths and medicinable fountains,” he was not aware that such imitations had been already made. Herodotus, indeed, a successor of Galen, had declared long ago that the copies were not equal to the originals.

We shall see presently that, as regards baths, everything has been done that Bacon could have wished ; and it is the

same with medicinale fountains, of which imitations have now for a long time past been prepared ; and Struve deserves every credit for the artificial waters which have made his name so well known. They are truly called imitations, for they are seldom exact enough to rank even as accurate copies.

And this is not surprising, while the exact chemical constitution of mineral waters is by no means positively determined. Whether the presence of minute quantities of a great many salts is of any real importance, whether nature's polypharmacy is more valuable than man's or not, it is very difficult to add these fractional quantities accurately to artificial waters, and the organic matters, such as *barégine*, present in some, cannot be imitated at all.

As these artificial waters are but imperfect copies (in many cases, as in that of Seidlitz powders, having no resemblance to the real article), perhaps it would be better if the actual contents of the bottles were specified on the outside, instead of the name of the spring they imitate ; indeed, the affixing names of places to artificial waters is forbidden in Austria. In most continental countries a licence is required from the State for the manufacture of such waters. In any case, however, it is an objection against them, that we can only have the guarantee of the maker's name for their being what they profess to be. There is no certainty that they are of one uniform standard.

Strongly mineralized waters are the most easily imitated, and their imitations the most useful : weaker waters, in which there is great faith when they are drunk on the spot, as for

instance those of Eaux-Bonnes, can positively not be imitated with the slightest advantage. On the whole, therefore, now that the art of bottling waters securely is understood, and that it is known that most natural waters may be made to keep quite well, by the exclusion of all atmospheric air, it seems probable that the original bottled waters will be greater favourites with the public than their imitations. The only exception will probably be in favour of some of those used chiefly as articles of diet, such as soda and Seltzer waters, which owe their qualities mainly to the quantity of carbonic gas they contain, and which, without following very strictly any natural sources in their manufacture, are made very palatable—indeed often more so than the bottled waters in imitation of which they are made.

We have at all events learnt something from nature's chemistry, and know that by the aid of carbonic gas we can present many medicines to the stomach in a palatable shape, and one likely to favour their absorption. The exhibition of medicines in a state of effervescence is a great step in practical therapeutics.

Alkaline and saline waters—such as those of Vichy, Vals, Bilin, Fachingen, or Karlsbad, Marienbad, and Eger—are among the best of these exported waters. Iron waters do not, even when the greatest care has been taken, keep well; the iron constantly gets precipitated, and it may be much doubted whether Schwalbach or the weak Bussang waters, away from their sources, are so good as their imitations, or indeed so good as the ordinary milder pharmaceutical preparations of iron.

Well-bottled waters from the original sources are however, generally speaking, better than their imitations, and there can be little doubt that the mere medicinal action of the waters on the system, if they have not undergone decomposition, must be essentially the same, whether the patient drinks them fresh at the source or at home. But we have endeavoured to show, that the whole *rationale* of the use of mineral waters is different from that of taking ordinary medicine ; that their value is immensely increased by the various aids, of entire change of air and of habits of life, of the baths and other appliances of watering-places. The influence of the imagination, too, is lost—one by no means to be overlooked.

Although, therefore, there are various conditions in which the use of exported waters may be convenient, drinking them at home can never take the place of drinking them at their source, and this is the general feeling of patients ; they usually declare that mineral waters drunk at home, with the exception of some simple aperient ones, have not the same effect as when drunk at their fountain.

The larger the amount of mineral constituents in a water, as a rule, the less does it suffer by transport.

The exportation of their waters is a considerable source of profit at many wells ; the sale of exported waters has now become very extensive indeed, and is becoming greater every day. Waters even cross the Atlantic, and certain American ones, innocent of any but the feeblest mineralization, are drunk with faith by many poor ladies, who hope to be cured of cancer, and of every conceivable malady, by their use.



CHAPTER IX.

ARTIFICIAL BATHS AND INHALATIONS.

THERE is no occasion to discuss here the infinite variety of these, general and local, that have been popular at various times ; for instance, those of horse-dung, or those of malt, in which cases there is generation of carbonic gas, or such things even as baths of blood and baths of tripe ; but I have to notice some of the forms of such baths, which form a part of bath or other popular methods of cure at the present day.

Arenation, or covering the body with the sand of the sea-shore, is a very old practice,¹ and has been recommended of late years by various French and German writers, and at different sea-bathing stations, such as Blankenberg and the island of Norderney. The patient lies in a hollow excavated in the sand, and has a layer of damp sand thrown over him. He is exposed to the full rays of the sun. The

¹ The buccanciers used to bury themselves in the sand for the cure of fevers so did the Irish. Dr. Graham, as is well known, exhibited himself towards the close of the last century buried in earth, with only his head, duly powdered, and pigtail above the ground, and beside him also buried his goddess of health the future Lady Hamilton.

process is said to cause free sudation, and to stimulate the skin. The exposure to the sun, however, appears to be a very doubtful measure.

This process is a very favourite one on the shores of the Mediterranean, and the following is an account of it as practised at Ischia, and best at *St. Restituta* in that island. The sand there is heated by the percolation of mineral waters and hot air from below. Fresh grave-like holes are dug in the sand, in which the patient lies down at full length, and is covered up to the neck with a depth of eight to ten inches of sand, the heat of which is about 108° to 109° . Weaker patients remain in this about a quarter of an hour, stronger ones half, or at most three-quarters of an hour. The deeper the hole is dug, the greater is the heat; besides profuse sweating, stimulation of the skin, amounting even to blistering, may be produced, if the process is kept up too long. This process, usually carried on in the open air, is not a favourite with any but the natives of the country. After the arenation is over, the patients sometimes bathe and wash themselves in the mineral water; others again roll themselves up in sheets till they are dry, thinking that rubbing off the sand will interfere with the efficacy of the bath.

Of late establishments have been founded in Dresden and elsewhere for the systematic use of sand baths. They are a convenient way of applying dry heat, at a higher temperature than that of the ordinary hot-air bath. The baths may be full, or half, or local, and are used for about 30—45, 45—60, or 60—90 minutes. After the sand baths, shower baths of various temperatures are commonly used. Up to the present

time these baths have been found most useful in rheumatism and in joint affections.

From very early times the *scum* or the deposit of baths has been collected and used under the very natural idea, that it contains in a concentrated form the principles on which the efficacy of the bath depends. In this way the bittern of brine springs has been used ; ochry deposits from chalybeates, and sulphurous ones from sulphur waters, as well as the half animal, half vegetable substances which grow in waters, such as those of Barèges and Gastein, and many other thermal springs, have all been employed.

We have seen how the mud has been made use of at Acqui, Abano, St. Amand, and other places.

The operation of all these baths is evidently the result of the action of thermal waters intensified, and accordingly their chief application has been to old rheumatic and gouty affections, contraction and enlargement of joints, chronic glandular enlargements and tumours.

But of all baths of this description, one, which it would be easy to introduce into this country, is by far the most popular ; it is one the virtues of which are freely admitted alike by bath physicians, who are sceptical about the powers of mineral waters, and by those who have most confidence in them : I mean *peat* baths.

Moor, turf, or peat baths are now supplied in most German spas. They consist of peat earth, which has been exposed to the action of the weather during winter, and has been thoroughly impregnated with the particular mineral water of the place. It is finely powdered and prepared to

a consistency of thick soup or broth. The average temperature of these baths may be considered 95° . Uninviting though the mess looks, and though at first one is unwilling to be immersed in this oozy, dirty-looking bath, when you have once got in and allowed the slimy broth lazily to cover you, a very pleasant velvety sensation is imparted to the whole surface. On taking one of these baths, one is able to appreciate in some degree the practical philosophy of the buffalo or of the pig, who enjoy immersing themselves in the mire in a hot sun. They show themselves good judges of what is pleasant to the feelings.

As to their physiological effect on the system, peat baths are more exciting than might be expected from their temperature, and even a local one will often cover the whole person of the patient with perspiration. These baths bring out eruptions more readily than mineral waters, and indeed, if carelessly used, they cause a good deal of irritation of the surface. They are considered to increase the activity of all the functions of the skin, to quicken the circulation and the renewal of tissue, and to stimulate the secretory organs and the nervous system.

How all these effects are produced, that is, through what power besides their thermality or heat, is quite undetermined. We have already seen that similar effects are produced by the mud of various baths; the peat earth and mineral impregnation of each bath vary somewhat, and the richness of the compost of each bath is praised up by its advocates; yet they all seem to produce the same, or very nearly the same, effect.

Although we know that salts are less likely to be absorbed from such a mess than from water, still the chemical composition of these baths has often been examined with a view to the explaining of their effects. A hundred parts of the peat earth of Teplitz dried, yielded 55.16 parts of inorganic matter, 44.84 of organic substances and water chemically united with them. Among insoluble matters are found humic acid, vegetable remains, minute quantities of lime and silex, and in some baths a considerable quantity of oxide of iron. The soluble matters are comparatively few and in small quantities, as sulphate of potass, magnesia, soda, iron, silicic acid. Peat baths generally have an acid reaction. A chemist has recently extracted from the peat bath of Franzensbad what he considers to be a compound salt, of sulphate and oxide of iron; sulphates of soda, magnesia, and lime; silicic, humic, and phosphoric acids, besides free sulphuric acid.

The one of these substances to which most has been attributed is iron, and we are told gravely of the styptic effects of some of these baths; but there is not the slightest reason to suppose that the baths containing most iron are more efficacious than the others. Inquirers into the subject of their efficacy have thought of the possible action of carbonic or other gases which are developed, of special organic matters, such as formic acid, which has sometimes been detected; but there is no satisfactory explanation, if turf baths are superior to other thermal applications, why they are so.

Peat baths are either taken before or after ordinary

baths, or they are used alternately with mineral baths, so that one day a common bath, next day a peat bath, is taken. Local peat baths and poultices are in great favour, and are often used for thirty minutes and longer; half peat baths, in which the body is covered up to the stomach, are seldom borne more than twenty minutes.

A mass of clinical observation seems to make it certain, that this general poultice applied to the whole surface, is of much use in the same cases as thermal baths. While less exciting than thermal waters of the same temperature, they seem to have more of a resolvent power in exudations and thickening of the joints; but indeed the variety of affections in which they are considered especially applicable is very great. I shall only mention anæmic conditions, congestion of liver and spleen, and spinal irritation, especially of an hysterical nature.

These baths, which are growing daily in popularity, are contra-indicated in patients inclined to congestions of the head, with disease of the heart, or tendency to phthisis, or where eruptions are present.

Peat water.—Baths of the common dark-coloured water impregnated with peat, so common in all our moors, containing some humic acid, have of late been used—indeed they are regularly employed in an establishment near Salzburg; but what their special virtues are, I have not heard.

Baths of Pine Balsam.—At many baths where pine woods are abundant, there has been got by distillation from the fresh green leaflets of the pines, a pretty clear greenish-brown fluid, of strong, pleasant aromatic odour, which,

along with various resinous substances, contains an ethereal oil and a little formic acid. This balsam is added in various proportions to baths, to make them stimulating to the skin. For children and excitable people one to three quarts are added. The quantity is gradually increased every day up to fifteen or ten quarts, and full-grown people may use double these quantities. The temperature of these baths varies from 80° to 100°. Their operation produces itching and pricking of the skin, and its general stimulation. They are found useful in chronic rheumatism, and in some neuralgias, and when a general stimulus to the surface is wanted. The balsam is also used still more effectively in the shape of vapour baths. These pine baths continue to be extremely popular, and are procurable at an immense number of the German baths.

Baths of *herbs*. *Kräuterbäder*.—Baths impregnated with aromatic plants were very popular in ancient medicine, and are even now occasionally employed. Some of the plants most used have been thyme, lavender, marjoram, rosemary, angelica, calamus, valerian, and wormwood. Those plants have been employed for vapour as well as for water baths, and have been recommended in hysteria and other affections of various natures. I observe occasional advertisements of their employment.

The baths of *Pennés* probably owe much of their popularity in France to the volatile oils which they contain in addition to their salts.

Baths of the fermenting *dregs of the wine-tub* have also been used in districts where grapes are abundant; there

is a great extrication of carbonic acid, and they act powerfully on the skin, but are not often employed.

Baths of *Whey*.—At certain whey cures, and other places where milk is abundant, baths of this fluid, of which, as a drink, something will be said afterwards, have been employed in great irritability of the nervous system, in neuralgias and over-irritability of the skin, and they are as efficient as baths of other bland fluids. Baths of milk, an expensive remedy, have been used chiefly as a cosmetic by voluptuous women (the story of Poppæa, Nero's wife, keeping 100 asses for this purpose, is well known), and sometimes in cases of great debility, in the hopes of a portion of it being absorbed where food could not be swallowed, but such uses do not come within the scope of this book.

The operation of vapour baths has been already discussed ; it remains to notice the applications of various gases to the surface of the body, at least of such as are employed at bathing-places.

Advantage was very early taken of escapes of gas from rocks in volcanic countries, and they were employed for the production of natural gas baths. Baths of this kind are to be found at *San Germano*, *Castiglione*, the *Solfatara*, and other places in Italy, and at *Cransac* in France. The gases are carbonic acid, hydrosulphuric acid, and exceptionally, at the *Solfatara*, ammoniacal gas. Most of these *stufas* contain aqueous vapour also.

Of late years, wherever carbonic acid or hydrosulphuric acid is abundant in mineral waters, arrangements have

been made for their use in baths, and *carbonic acid* baths have been much lauded. In some instances a stream of this gas is let into the bottom of an ordinary bath. But besides its employment in this way, the gas is collected from the mineral waters by a simple process, and by means of tubes is easily distributed for use as wanted. A patient going to take a bath of this gas, seats himself with most of his clothes on in a sort of box, in which his whole person is enclosed, except his head and neck. The gas is let in from below, and gradually rises and displaces the atmospheric air. This gas produces, after a time, a pleasant tingling sensation, and a certain feeling of heat accompanied with perspiration: it is said to quicken the pulse, and act on the generative organs. A bath usually lasts for ten or twenty minutes, but it must be discontinued the moment sleepiness, swimming of the head, or any other unpleasant symptom comes on. These baths have been used in paralysis and loss of power, also in some rheumatic affections; but their virtue, if any, is very trifling. Some writers, however, think highly of them.

This gas is also used locally in douches; it has been applied to the eyelids closed, when it produces a certain amount of tingling and burning; it has also been applied to the external ear-passages, but practitioners seldom place any real faith in such applications, which at first have a stimulating, but afterwards a deadening effect on the function of these organs.

Carbonic acid is also sometimes applied to relieve painful affections of the uterus, and as a local stimulus to it; but

the gas is very readily absorbed from mucous surfaces, and the practice is not unattended with danger. The baths of this gas appeared to me to be little used in most establishments. They are valued more in France than in Germany.

Hydrosulphuric acid is also at some baths collected from the waters impregnated with it, and is occasionally used in douches; even if not inhaled, the gas, if applied pure to the surface of the whole body, would have almost poisonous effects, and has to be much diluted, before it is applied. Of the effects of its application in this way in baths very little is known, but they are supposed to be analogous to those of carbonic gas.

Sulphurous acid occurs as an emanation from volcanoes, but as such has not been locally applied. Sulphur fumigations locally applied cause heat, slight tingling and redness of the skin, and free perspiration, to which no doubt the heat necessary for the vaporization of the sulphur contributes. They are a very old remedy in rheumatism, fever, and itch, and in epidemics to this day they are counted the best gaseous disinfectant. There has been quite a *furor* of late in Scotland about their use, but I believe it has nearly died out.

Chlorine.—Minute quantities of muriatic acid occur in volcanic and in sea air, and also in the air about the *gradir häuser*; but in the only local application of chlorine gas which is used, it is combined with the vapour of water. It is a strong stimulant to the skin, and after a time produces constitutional effects, including a certain amount of salivation; it is believed to act powerfully on the biliary

organs, and it is no doubt to the presence of this gas that the nitro-muriatic acid bath owes its efficacy, for as an acid solution can only act as a stimulant to the skin, the nitro-muriatic acid does not enter the system, and its efficacy, which has never been thought highly of abroad, must depend on the action of the chlorine which it contains.

In judging of the effects of gases used as baths, it must be remembered that, with the exception of carbonic acid, all the other gases are applied associated with the vapour of water. In many of these cases, unless special precautions are taken, and indeed in the uses of all mineral waters containing much gas, the inhalation of a certain amount of the gases is necessarily associated with their external employment.

Electrical Baths.—It has already been said, that electricity is an extremely useful aid in the thermal treatment of paralysis; nay, some are confident that it helps in the resolution of tumours. It was also observed that one explanation of the action of mineral waters was based on their electrical action. For instance, Schönbein considered that he had demonstrated that *positive* electricity is developed in some maladies, as the acute exanthemata, and *negative* in rheumatism. Rheumatism is cured by Baden waters; they have been shown to be *positively* electrical. It is thence inferred, that the cure is caused by electrical action, although, granting the facts, the theory of the cure is not very obvious. But all the common actions of life, the very friction of clothes on our persons, the passing a comb through the hair, the pouring water from one vessel into another, develop

electricity, not to mention its generation by the vaporization or pulverization of water.

It is impossible to accept many statements respecting the electrical effects of mineral waters; we are told that after using the Karlsbad waters for some time, ladies find their hair, when let down, stand apart. This lady feels an electric shock, when she gets into a mud bath; that gentleman feels one, when he plunges into the sea. But this subject is alluded to here only, because electro-galvanic baths are often connected with sea and other bathing establishments, and the galvanizing a patient in water baths between the poles of a battery has become a very popular practice. The negative electrode is put in connection with the metallic side of the bath, and the positive is put into the hands of the bather. The water is acidulated sufficiently with nitric or hydrochloric acid to make it stimulating to the skin. While the legitimate application of electricity in medicine is being studied and gradually developed, such applications as galvanic baths are chiefly meant to tickle the fancy of the public, and have fallen very much into the hands of charlatans.

A portion of treatment, to which much importance is attached at many baths, is the *inhalation* of the vapours and gases of the waters, a subject which may be conveniently noticed here; and first of the *vapours of common salt*.

They are inhaled cold, by patients who are made to walk along and in the neighbourhood of the giant fences of fagots, through which the water of the salt springs is made to

trickle for purposes of concentration ; patients are directed to choose the side of the hedges (*gradir häuser*) protected from the wind, as there the air is richest in saline matter ; they are also directed in fine weather to rest on seats in their neighbourhood. It is calculated that 7 or 8 grains of salt are inhaled per hour. It seems very problematical whether, in the inhalation of such air, there is any gain beyond what results from a comparatively cool, moist atmosphere in hot weather. Such unsightly fences are to be found at Krcuznach, Kissingen, Nauheim, Reichenhall, and elsewhere.

Saline air is also presented by a process of pulverization in inhaling-chambers at many of the salt springs ; it has been calculated that 10 grains of salt are inhaled per hour by this process ; and the warm vapour may be inhaled by various arrangements, as it rises from the heated salt-pans. These inhalations are found to be useful in chronic catarrhs of the mucous membrane of the air-passages, and in bronchitis.

Chlorine.—As infinitesimal quantities of this gas, probably in the form of hydrochloric acid, are present in sea-air and in the vapour of salt-pans, it has been supposed that its vapours might be found useful, and at many baths the inhalation of chlorine gas, mixed with atmospheric air, has been tried, but the results have not been satisfactory.

Sulphur.—The vapours of this substance have been a favourite remedy from the earliest times. Galen sent patients to Sicily to inhale the sulphur fumes of Mount *Ætna*, and lately, in Scotland, not only serious chest affections, but

rheumatism and neuralgias have been cured by it, could one accord full credit to the statements. However, it is in the form of hydrosulphuric acid that it chiefly occurs in mineral waters, and there is not now one of the numerous sulphur baths, hot or cold, in which inhalation does not form a portion of the cure. A popular handbook says, "Hydrosulphuric acid tones down the action of the nerves, retards the circulation, favours excretion, and by its continued action produces a general perspiration." It must be used with care ; and where there is irritation of the lungs or cough, it must be slowly and quietly inhaled, as otherwise it is apt to cause congestion of the lungs ; for purposes of inhalation the atmosphere of large rooms is impregnated with it, and usually along with some nitrogen and carburetted hydrogen gas, the first of which predominates in the Pyrenean, the latter in the German baths. Such inhalations are considered in Germany, and still more in France, to be very useful in pulmonary cases. They are more so in laryngeal ones. But the risk of suffering from the change from a close room to the open air counterbalances its advantages. Of the absolute effect of the inhalation of hydrosulphuric acid in any but large and poisonous doses, very little is known ; and it has been ascertained that not more than three milligrammes of it per hour are inhaled in any inhaling-rooms. As nitrogen to a certain degree takes the place of oxygen in these waters, the air inhaled may be thus less exciting, and therefore more soothing.

But, after all, the effect of these inhalations is perhaps more negative than positive, and the importance of the

inhalation of aqueous vapour along with the gas must not be forgotten.

Carbonic acid is exciting when present in the blood in small quantity, paralysing when in large: at some baths it is necessary to take precautions against its excessive accumulation in the bottom of chambers. The gas cannot be inhaled pure, and is used only in the proportion of two to four per cent. of atmospheric air; it is inhaled in cabinets, into which the gas is made to flow from below. To make the gas less exciting, some moisture is added to the air. The effects are said to be, quickening of the respiration; the expiration is more complete; there is acceleration of the pulse, and a feeling of warmth in the chest; lessening of secretion into the bronchiæ, and dryness of the throat; then perspiration breaks out, and there is swimming in the head, and the process must be stopped. The gas is said to improve the secretions of the air-passages and to quicken the activity of the lungs, but all this is, to say the very least, problematical; and in most places, as already observed, the carbonic acid cabinets seem to me to be deservedly falling into neglect.

Oxygen.—Although more or less of this gas is present in drinking and in many mineral waters, little is known of the effects of any inhalation of the gas derived from natural sources, and nothing need be said here of its artificial preparation and exhibition.

Nitrogen.—This gas is present in considerable quantities in the waters of Lippspringe, Teplitz, Buxton, and many of the Pyrenean and Spanish baths; and its inhalation, as

practised at some of them, is supposed to be useful in pulmonary complaints. If it be really of any use, it is probably by diluting the air, and thus letting a smaller quantity of oxygen, which is somewhat of an irritative, enter the lungs.

Carburetted Hydrogen.—Of the effects of the inhalation of the small quantities of this gas which are sometimes associated with other more abundant gases of mineral waters, nothing positive is known. This gas, which has much analogy with naphtha, a favourite remedy in the East in cutaneous disorders, appears to be more abundant in the waters of La Porretta than of any other place.

Vapours of balsam of fir.—Even in ancient times patients were recommended to inhale the air of pine-forests, and at the present day the neighbourhood of fir-woods is considered to be one of the great advantages of places for consumptive patients; for instance, Bournemouth and Arcachon. The use of a bath with fir balsam led very naturally to the inhalation of that substance, as it is practised at Ischl, Reichenhall, and other places; and there is no reason to doubt, as balsams have always been employed for such purposes, that moist air impregnated with fir balsam may prove useful in bronchitic affections, and tend to allay irritation in them; indeed, in close analogy with this are the medicinal inhalations of air impregnated with turpentine, creasote, or carbolic acid.

The great argument against the special value of any one of the inhalations we have alluded to, is that their fashion changes constantly—for a few years or months this sub-

stance is the favourite, in a few another takes its place. An enthusiastic practitioner, probably a young man, convinces himself that he has hit on a new remedy of extraordinary efficacy ; or a less scrupulous one, or a quack, satisfies himself that he has discovered what will at least take the fancy of the public for a time, and that is all he cares about. In all these varied inhalations, the only element which remains constant is a certain amount of warm aqueous vapour, which seldom fails to be soothing in bronchitic and laryngeal affections.

BOOK III.

DIET CURES.

CHAPTER I.

POPULAR CURES FROM THE VEGETABLE WORLD.

IN the enumeration of appliances connected with baths already given, one might suppose that the list of modes of treatment supplementary to regular medicine, had been exhausted. But this is far from being the case, as will appear most readily by looking at a few German bath advertisements, which contain many odd things, besides inquiries for a little English boy to come and play with another one for so many hours daily.

At one place we hear of the wonderfully successful results not only of pine-leaf vapour-baths, but of steel, malt, bran, salt leys, salt spring, and vegetable baths. Another place, we are told, lies 1,700 feet high, "above the consumption zone." We read of Irish-Romish baths, with all kinds of medicinal, carbonic acid, and electric baths; the English part of the advertisement describing them as "Turkish—tub—

steam, and overthrowing baths." We also meet with this beautiful collection of remedies : goat whey and mineral water establishment ; also baths of Kreuznach salt ley, of sea-salt, of sulphur, of malt, of bog, of calmus (I suppose *Calamus aromaticus*), and of fir-leaves ; also drinking cures of all sorts of herbs, as well as of natural and of artificial waters ; and we may wind up with a dietetic Schrothisch institution, where every disease under the sun is treated.

Although the French very naturally praise the beauty and other attractions of their baths, I have not lighted on any of their advertisements which quite come up to the German ones. The following is a tolerably characteristic one :—
" Perfected apparatuses, vast gymnasium, baths of condensed air, a piscina for swimming, vapour baths and douches, medicinal and electrical baths, &c.; everything has been united to form a complete *ensemble*." I am quite aware that we have no want of more or less quackish advertisements in England, but their style is different from that of foreign ones, and certainly not superior.

But of these numerous remedies, we can only glance at some having a bearing on *diet*, and diet mainly meant to cure in a season, like mineral waters. The popularity of some of these cures is unbounded ; and that patients have often benefited by them, is certain. It has been justly remarked, that it is not unworthy of the attention of the regular practitioner, to inquire what are the elements of success in such cases :¹ and these seem to be, first, that

¹ Although it is quite ascertained that people can reduce their weight much by strict rules of diet, that which was called Banting's system is already out of

the patient, owing to the amount of faith which he places in a new mode of treatment, gives up injurious articles of diet, which he would not otherwise have done ; in the second place, a certain amount of simplicity of food and of regularity in the hours of taking it is enforced, which is advantageous in many cases ; and thirdly, these modes of treatment are believed in some instances to supply to the system certain substances of which it is in want.

The *dry method* consists essentially in reducing the quantity of water drunk to a minimum, and making the diet consist chiefly of bread and biscuits ; while wine is allowed, and the smallest quantity of meat. A diet of this kind is continued for six or seven weeks. The essential of this mode of cure rests in the diminished supply of water, and the effect of this on the blood. The results of Jurgensen's experiments were these :—"Water and the solid constituents of the body are lost, and this in the greatest degree during the first three days. The temperature of the body often rises to 104° . By carelessness you may produce a scorbutic condition—the patient complains much of thirst.

"It is certain that you can produce concentration of the serum of the blood, and probable that you can accelerate the renewal of tissue. Under treatment the weight of the body constantly decreases, but whenever the process is given up, it increases again, and indeed comes to exceed the original weight."

fashion in England, while it is comparatively in favour in Germany. Its main principle is, to select a diet consisting chiefly of albuminates, and especially of the lean of meat, with as few hydrates of carbon as possible, and one which is also somewhat stimulant, so as to favour the conversion of tissue.

This system has been for some years carried out at Marseilles, Montpellier, and other towns in the south of France ; and in a variety of it, which has been called Schroth's cure, portions of the hydropathic treatment have been adopted. Every variety of disease is to be cured by this method. It enforces abstinence, and the hunger cure has no doubt always been a valuable agent in medicine, although patients will rarely practise it in their own houses, especially in these days when the feeding up system is the fashionable one.

Extract of Malt.—Hoff's extract is a sort of beer, which is moderately purgative, from the bark of the black cherry said to be used in its preparation. Its popularity has led to the preparation of purer extracts, such as Lincke's, and malt is an element of Liebig's food for infants. Malt is at present wonderfully popular abroad, and even soaps of it are advertised. In former days in England the use of malt was recommended in scrofula and phthisis ; and some of the highest modern German authorities, such as Niemeyer, bear testimony to the value of Lincke's preparation. He says that it is free from the deleterious properties occasionally manifested by Hoff's beer. He has, in cases where a nourishing diet is required, and when the digestion is too weak for animal fats or cod-liver oil, administered it with the most satisfactory results. But extract of malt has been mentioned here chiefly owing to its richness in sugar, in which respect it excels ripe fruits and grapes, which we have to examine presently.

In England *herbalist* cures are almost forgotten ; not so in

Germany, where the cures of the shoemaker Lampe, at Goslar, were a few years ago counted marvellous ; but they would scarcely have come under our notice, were not such medicines used frequently in association with salt baths or some of the whey cures, and that in Germany they are often used as a preparation for bath cures.

The fresh expressed juice of water-cress, dandelions, couch-grass, willows, &c., is recommended to be used in spring, but in moderate doses of two or three teaspoonfuls daily on an empty stomach. Larger doses are not usually borne well. Where it does not agree with the stomach, we are directed after each spoonful to drink a wine-glassful of Seltzer water, and this to be followed by a cup of pure black coffee. Improved digestion, increased appetite, and slight movement of the bowels are the results of this treatment, which is usually continued eight to fourteen days. I should not myself recommend any such preparatory course.

But another kind of *bitters* is prepared in two or three Alpine stations, which has at present a great reputation in Germany, and is doubtless of some use at both Reichenhall and Kreuth, where the drinking sources are of no great importance ; or at Heiden, where they have only whey.

Apparently, bitters are favourites in all mountain climates. Just as bitters are at the present day made of the elegant common centaury (*Erythræa centaureum*), in the West Highlands of Scotland, and as old Burton recommended, "centry sodden in whey," so in Switzerland they manufacture various compounds, rejoicing in such names as "Alpen kräuter," "magen bitter," all varying according to the fancy of the

local compounder, all intended to stimulate the appetite. The *Reichenhall bitters* are prepared of the fresh juice of *Taraxacum*, *Veronica beccabunga*, *Trifolium fibrinum*, and *Sisymbrium nasturtium*, and are now largely despatched to all parts of Germany. I have no doubt that the preparation may be efficacious, for it resembles many of our remedies for liver, and that it may be useful in cases where taraxacum is indicated—a medicine, by the way, to which a sort of specific action on the biliary secretions has been attributed. There is a considerable quantity of potass in the ash of the taraxacum bitter, to which a portion of its alterative qualities is ascribed, and no doubt potass acts more powerfully on the system than soda. Many patients become quite fond of this mixture; I cannot pretend to have found it palatable. The dose is from one to two ounces daily, about ten o'clock in the morning.

Two other vegetable juices may just be mentioned:—The sap of the *birch* tree, from which a pleasant effervescing drink is made in Scotland, and which in former days, taken in the quantity of eight ounces in the morning, was thought to be anti-scorbutic, diuretic, and useful in stone.

The sap of the *pine*, which has of late years been used in the Landes, in quantities of half to a whole tumbler, morning and evening. It has been found useful in chronic bronchial affections, where digestion and assimilation are imperfect, and even in early stages of tuberculosis.

We might thus in many parts of Great Britain, particularly in Scotland, supply several of the popular continental remedies—bitters, sap of birch and of pine, pine balsam, in

addition to peat and peat-water baths. But we pass on from these, most of them, curiosities of medicine.

Fruit, and *grapes* in particular, have in all times been used both by physicians and by the laity as grateful and useful to patients in sickness, but it is only of late years that their systematic employment as a means of cure has become common. The juice of grapes consists of, in 1,000 parts—

Water	830—860
Grape sugar	150—300
Other constituents	20—30

These last consist of silicates and phosphates, and of soda, potass, lime, &c. ; of tartrates of lime and of potass, of some mucose and pectine. The skins contain aromatic ethereal oils, and the stones a good deal of tannic acid, and some fat. But the composition of the juice varies immensely according to the weather of the particular year, the nature of the soil, the species of vine, its mode of cultivation, the degree of ripeness, &c. On dry soil grapes yield much more sugar than on moist, more in warm than in cold climates ; and the geological nature of the soil has much effect on the nature of their inorganic constituents.

In Switzerland the division of grapes into *Fendants* and *non-Fendants* is of some importance for the grape cure, as the first contain less sugar and less acid than the second, but more gum and albumen. The following analysis of 1,000 parts of the Clairette (*non-fendant*) will give an idea of its chief constituents :—

Water	824
Sugar	140

Gum and dextrine	5
Albumen and nitrogenous matters . . .	15
Iron	0.63
Potass	1
Soda	2.5
Lime	1.8
Magnesia	0.9
Tartaric acid	4.3
Malic ditto	2.9

Grape juice has been compared with the waters of the Grande Grille at Vichy ; in 10,000 parts the inorganic constituents are :—

	GRAPE JUICE.		GRANDE GRILLE.
Chlorine	0.26		3.24
Sulphuric acid	1.09		1.64
Phosphoric acid	4.71		0.70
Silicic acid	3.44		0.70
Potass	17.94	} 23.8	1.82
Soda	5.82		22.3
Magnesia	2.76		0.97
Lime	5.09		1.69
Iron and Magnesia	1.50		0.12
	<hr/> 42.7		<hr/> 30.11

On the whole, therefore, the grape cure supplies us with a somewhat complicated solution of salts, along with a great deal of sugar and small quantities of albumen and gum ; the salts combined with inorganic acids may amount to in the 16 ozs. to 24 grs., with organic acids to nearly 40 grs., while the sugar may vary from $2\frac{1}{2}$ to 5 ozs.

The following are the physiological effects of eating fresh grapes. Little is known of the digestion of grape juice, but it is probable that the grape sugar is partly absorbed in the stomach unchanged, and is partly converted into lactic acid. Grapes usually, during the first few days, cause

frequent and fluid motions ; after a few days, if the cure is borne, the purgative action becomes more regular, and varies from five to six motions a day ; sometimes, however, there is no laxative action. Usually the appetite is increased, the digestion improved, the secretion of bile increased, the circulation of the portal system and the peristaltic action of the bowels accelerated. Sometimes in the first few days there is a certain amount of excitement, with quickened and fuller pulse, and tendency to congestion of the head occurs ; but this usually passes off, although this stimulation seems occasionally to have gone the length even of producing hæmoptysis and bleeding at the nose. The grapes act with the greatest certainty on the kidneys, always augmenting their secretion, and, like all fruits, rendering the urine alkaline, diminishing perhaps the amount of urea. The general effect on the system is sometimes that of resolution and absorption, at other times it is nourishing and strengthening, and even produces fattening. But these effects vary much in different places and in different seasons, showing how much depends on the varying quality of the grapes. In the alleged fattening, the animal diet allowed and mountain air have their share.

From what has been said of the physiological action of grapes, some of their uses may be inferred :—

I. General resolving action on the abdominal organs, exercised in everything depending on abdominal plethora. Good effects have been observed in dyspepsia, jaundice, congestion of liver, of spleen, and hæmorrhoids ; in short, in most cases in which purgation is applicable.

2. In chronic catarrhs, whether of the respiratory or of the digestive mucous tracts. Combined with mountain air, grapes seem undoubtedly to be of some use in the former ; in the latter they should be used with much care. They have frequently brought on irritation bordering on that of dysentery. Curchod's statement that he has cured with grapes many cases of diarrhœa among Indian officers is important, if such favourable results could be usually counted on. I am aware that lime-juice is a favourite Italian remedy for diarrhœa ; still I believe that unripe grapes would be injurious, and that the trial must be made with perfectly ripe ones. When they are efficacious, I take it to be much in the same way as the Indian Bel fruit is useful, which contains little acid, but much mucose and pectine, the quantity of tannin present being so small, that much cannot be attributed to it.

3. In the early stages of tuberculosis it is considered by many competent medical men to be of advantage, but this can probably only be the case when there is a tendency to inflammatory action. Probably they act by soothing the mucous surfaces ; and the large quantity of sugar, which has always been a favourite remedy in phthisis, present in grapes, may also help.

These are some of the chief applications of the grape cure. I confess that, apart from the season of the year, and from other favourable influences co-operating, the effects do not appear to me to be very striking. Very discordant results have been obtained by those who prescribe the cure in different districts. The watery grapes of Meran have a

different effect from the rich, sugary ones of Montreux. Grapes often act as a rather irritating, unpleasant purgative.

The doctor must determine the quantity of grapes to be eaten in the particular case. It depends on the age and constitution of the patient and the nature of his malady. On the whole it may be counted at three to six pounds a day, and may reach eight and even twelve pounds. A man has been known to eat 300 pounds of grapes in four weeks. The grapes should be quite ripe, have thin skins, and the fewer stones the better.

One begins with small quantities and goes on gradually to large ones, and the quantum is divided thus: about a quarter before breakfast, a half between breakfast and dinner, and the other fourth in the course of the evening. The meals are directed to be as simple as possible; but there is no particular article among the simpler ones of diet to be avoided unless milk, which does not agree with the grape cure. Of course the skins are not swallowed, and it is an objection to the cure for children, that they are apt to swallow them. To save trouble in mastication, the fresh squeezed-out juice has been recommended. Small presses have been made to squeeze the grapes, and the juice will keep when well bottled; but drinking it is not so efficacious as eating the grapes, in which process their juice is swallowed slowly, and properly mixed with the saliva. The average length of the course is three to four weeks.

The grape cure occasionally produces very obstinate dyspeptic symptoms, with aphthæ in the mouth, and jaun-

dice, the latter chiefly in children, also a very disagreeable inflammation of the mouth. It is sometimes injurious to the teeth, especially if caries exists. On the whole a grape cure is a powerful agent, and not to be too lightly undergone by patients. It suits men better than women, and is not at all adapted for children. The season for it is from the middle of September to October.

Bingen and *Dürkheim*, *Vevay*, *Montreux*, and *Meran*, are some of the favourite grape-cure stations.

There are other fruit cures, such as *cherries*, *apricots*, *pears*, *apples*, *lemons*, *oranges* (ten to fifty in the day of these last), &c., but strawberries alone can be mentioned here.

A rough analysis of *wild strawberries* gives in a thousand parts : water, 872 ; soluble substances, 64 ; insoluble, 63. In the first, sugar, 32 ; free acids, 16 ; albuminous substances, 6 ; pectine, 1.5 ; ashes, 7.3. In the second, seeds, skin, and cellulose, 60 ; pectine, 3. Wild strawberries, of which we speak, contain much less sugar, but more salts, than garden ones, and a little more acid. Strawberries contain twice as much acid as grapes, but only one-fifth of the same quantity of sugar, while they have about one-half more of salts. Their action appears to be aperient and diuretic.

Strawberries used to be employed formerly by physicians of repute in hypochondriasis, gout, and stone, and even in consumption, but little is known on the subject. Of late their use has been revived, and *Interlachen* is counted a convenient spot for their use, as they are abundant there

the whole summer through : but we must recollect that, however refreshing strawberries are, they supply very little nutritious matter ; they contain less sugar than any other fruit, but a great deal of acid, and more iron. They are usually contra-indicated when there is a tendency to diarrhœa. Wild strawberries do not grow in such abundance in Great Britain as in many continental places. Indeed, in most places on the Continent strawberries are offered you for breakfast during many months of the year.

CHAPTER II.

MILK AND ITS PREPARATIONS.

Milk supplies a complete specimen of an article of nutrition supplied by nature. It contains along with water, an albuminate in its casein, a fat in its butter, a compound of carbon in its milk-sugar, and besides this a small quantity of inorganic salts, and all these mixed in such a way as exactly to meet the wants of the suckling. But perfectly adapted though it is for them, it was never meant to be the sole food of children, much less of adults, as it does not possess the stimulating properties of other articles of diet, especially of meat. But though not sufficient by itself, it is most useful in conjunction with other food in modifying the nutrition of the system at all ages.

Milk varies very considerably in its composition in different districts and countries. The way in which the cattle are fed has most effect on the quantity of the water, casein, butter, and sugar which it contains. Heavy rains produce a very marked effect. Various aromatic plants may in certain pasturages impart an aromatic flavour, just as turnips do theirs. Even during the course of the day

there are considerable changes in milk. Although there is little difference in their specific gravity, yet the solid constituents of the evening milk are considerably greater than those of the morning, and very remarkably so in the amount of butter.

Of the three kinds of milk chiefly used for invalids, cows' milk has the largest, asses' milk the smallest, amount of solid constituents. Goats' milk is between the two. Protein substances are also considerably more abundant in cows' than in goats' milk, while asses' milk does not contain one-half so much of them as goats'. In the amount of butter and of sugar, cows' and goats' milk are pretty much on a par. Asses' milk is very poor in butter, but richer in sugar and in salts, than either cows' or goats' milk. The accounts of ewes' milk vary, but on the whole it is rich in constituents. Mares' milk seems to be poor in butter and casein, but to be rich in sugar. Buffaloes' milk, according to Vernois' analysis, is very rich.

In round numbers cows' milk may be said to consist of, water, 857 parts; casein, 48; albumen, 6; butter, 43; milk-sugar, 40; salts, 6. These salts consist chiefly of phosphates of lime and magnesia, iron, chloride of potass and of soda, and phosphates of the same.

Skimmed milk is the milk with the cream removed, after it has risen to the surface; *butter-milk* is what remains

* Good milk should contain 130 to 140 parts of solids in the 1,000 parts. A comparative table of milk from Becquerel and Vernois gives as much as 196 for Angus, 182 for Tyrol, 162 for Bretagne, 160 for Holland, 142 for Belgium. Muspratt gives 135 as the average for England; but London milk falls short of that average.

of the cream after it has been deprived of its butter ; *whey* is the serum of the milk which remains after the butter and curds have been removed, but a considerable portion of its salts are lost, most of its phosphates being precipitated in combination with the casein. Ten parts of milk yield about six of whey. In a general way a pound of whey may be said to contain from 36 to 40 grs. of salts, consisting of 10 to 14 grs. of chloride of potass, 2 to 3 grs. of chloride of sodium, and some 20 grs. of phosphates, besides about 350 grs. of milk-sugar.

With respect to the physiological action of milk and of whey when drunk,—in the case of *milk*, the casein is first coagulated by the gastric fluids, and is afterwards partly dissolved in the process of digestion, by the approach of alkaline fluids and of bile, and, perhaps, partly converted into an albuminous solution. The whole of the casein appears never to be absorbed by the stomach ; a small portion passes into the duodenum. The butter, which oxidizes slowly, appears to be re-absorbed in the small intestines unaltered, and reaches the lacteals in the form of an emulsion ; while the greater portion of the milk-sugar is converted into lactic acid, and reaches the blood, where it is readily oxidized.

As to the general effect on the system, there is no food that is so quickly digested by a healthy stomach, none that excites so little. Indeed some have attributed a soporific action to it ; it does not increase the production of heat, or quicken the circulation ; and if it increases any secretion, it is that of the urine. As so much of the milk is absorbed

into the system, only small masses of fæces are formed. Its tendency, therefore, besides being generally sheathing to the intestines, is to cause constipation. Milk is unusually nourishing, and promotes the deposition of fat, especially when it contains much cream.

The action of the *whey*, which is a weak solution of salts and of milk-sugar, and is a fluid with a mawkish taste, which is agreeable to very few persons, is not very marked ; in large quantities it readily produces dyspepsia and an uncomfortable state of the mouth and gums. It is generally laxative, often producing diarrhœa. It acts very distinctly as a diuretic, but it also occasionally causes constipation, and even a slight amount of jaundice. It is believed to increase the secretion of mucous surfaces, of the liver and of the skin. If not taken in too great quantity, whey is absorbed rapidly. The clearer it is—that is, the less butter or casein it contains—the less likely is it to cause dyspepsia.

Milk has long been used in sickness and in cases of debility. Hippocrates used to order milk and wine. Two centuries ago a milk diet was a favourite remedy for gout, and a century ago Dr. Cheyne laid before the English public the wonderful virtues of milk. At the present day milk and brandy are often used in reconstituent medicine ; and what more popular remedy is there than old man's milk ? Who has not had occasion to witness the good effects of milk and lime water in irritation of the stomach, and in some forms of dyspepsia ? But it is rather with the systematic use of milk as an article of diet that we have here to do, and more particularly with its nutritive effect in combination

with country and mountain air ; as, however, I think it is not sufficiently valued in medicine, I shall say a few words as to its use in some forms of chronic disease.

In various advanced stages of disease, and of perverted nutrition, of which it is difficult to define the exact nature, but in which drugs appear to have no effect, the steady use of milk appears to produce a complete change of the nutrition. Dr. Karell, of St. Petersburg, and others, have advocated its use in somewhat like the following manner :—The patient begins with 2 to 6 ozs. of milk three times daily ; it must be taken at fixed hours, for if specific directions are not given, as for medicine, the patient will not adhere to the use of it. The quantity, when the milk agrees, is to be gradually increased, and patients often get to take as much as 10 or 12 glasses daily ; the good effects are then apt to cease, and it is necessary to revert to the small doses again. The milk is generally best borne tepid, and should be taken in slowly, just as grapes should not be eaten when very cold, and should be swallowed gradually. If the milk causes much thirst, a little Seltzer water may be taken. Patients are to be kept as much as possible to this diet, but a little stale bread one day and milk soup the next may be allowed.

Dr. Karell says that from this treatment he has met with quite unexpected success in various cases of hypochondriasis and dyspepsia, neuralgic affections of the intestines, in congested liver, and even in dropsy connected with enlarged liver. Dr. G. Keith, of Edinburgh, tells me he has used the treatment with extraordinary success in some of these last

cases, and also (what from my own experience I should be quite inclined to expect) in old diarrhœas ; but he finds it difficult to get patients to stick rigorously to the milk, and to small quantities of it. The complete *rationale* of the good effects of milk given in this way is not very plain. Since the first edition of this book a good deal has been written in England in favour of the curative effect of milk in various chronic affections, and also in fevers.

But the good effects of milk diet in general conditions of the system, and where there is a tendency to tuberculosis, are much more generally admitted. It is accordingly often found extremely useful in combination with country air in anæmic states, the result of acute illness, or of loss of blood in scrofulous and rachitic children, but, above all, in threatened tuberculosis, in which its use has been popular, with some interruptions, since Galen used to send patients suffering from it to the milk cure at Stabiae.

The general indications for its use are so well laid down by Niemeyer, that I shall quote what he says :—"In the selection of suitable diet for consumptive patients the old rules, derived partly from common experience, agree completely with the views now received in physiology respecting nourishment and renewal of tissue. All the articles of food especially recommended to consumptive patients contain large quantities of fat, or of substances which form it, and proportionately little of protein substances. This selection corresponds with the empirically ascertained fact, that the production of urica or the conversion of nitrogenous elements is increased by a large supply of protein substances, while

on the other hand the conversion and expenditure of the organs and tissues most important to the organism is reduced by an abundant supply of fat and fat-forming articles. Therefore the freest possible use of milk cannot be too strongly recommended to phthisical patients. But it is entirely superfluous, and indeed erroneous, to remove the casein from the milk, and make it be drunk in the shape of whey ; this can only be necessary in the rare cases, when the stomach bears whey well and milk badly. When I frequently order my patients to drink three times daily a pint of milk warm from the cow, my only object is that the milk should not be robbed of any of its constituents or skimmed before it is drunk."

Warm milk is, like other warm fluids, useful in chronic bronchitis. Milk is also an agent of very great value in affections of the stomach and of the intestines. It is easy to see how it is useful when we do not wish to give these organs much work to do ; in chronic catarrhs of the stomach, and in perforating ulcer, milk is constantly used with great advantage. In infants, when amylaceous food is given too early, a return to milk is often the appropriate remedy. It is also useful in chronic diarrhœa and dysentery ; in the chronic diarrhœa of children its use is familiar ; and it is an old and rather neglected remedy in dysentery. If used with care, it is a valuable adjunct in many stages of the disease, and I believe that if more freely and systematically used, it would be found to be one of the best cures for the obstinate diarrhœas and other sequelæ of tropical dysentery ; of course the milk must be taken with care, and it must be

ascertained whether it is digested or not. If given in too large quantities, it may overload the stomach and increase the diarrhœa.

To improve general constitutional states there is no necessity, as in Dr. Karell's employment of it, for the milk being drunk at precise hours and in precise quantities. The chief object is to drink the milk in such quantities as are digestible. There is no virtue in drinking milk warm from the cow if you do not like it; many drink cold milk more readily. It is better to have it previously boiled. The following is the regimen usually recommended. Let the breakfast be of milk, and let three or four cups be taken of warmed milk with some bread or biscuit. It is best to begin with skimmed milk, as the milk is often rich in Alpine pasturages. There is no objection to a little cocoa or tea with it. Some hours later, or about ten or eleven o'clock, the patient should take two more cups of milk. At one or two o'clock the patient should have a simple but nourishing diet of roast meat and vegetables, with a glass of good wine or of sound beer. At five or six in the afternoon two more cups and some bread should be taken, and thus patients may gradually come up to sixteen or twenty cups daily. At any time when the patient begins to get tired of the quantity of milk, or there are symptoms of its disagreeing, the quantity is to be reduced, or even for a time discontinued; there are few patients who, if they begin with small doses, cannot take milk, although a patient will often assure you that milk always disagrees with him.

The main virtue of a milk diet is, that it supplies nutri-

ment which can be easily assimilated, and does not make any great call on the powers of the system.

Whey.—Although it is only within the last few years that the use of this drink has reached its full development, it is by no means a new remedy. Old Burton, while he thought milk increased melancholy, said that whey was most wholesome. About a hundred years ago we read of people going to the head of the Solway Firth for three weeks “to the whey,” or to the Highlands for goats’ whey, and Tabitha Bramble was very near sending her dog Chowder to the whey cure at Abergavenny ; and Bath posset, or whey, used to be made by boiling two parts of the mineral water with one of milk.

There is a great deal of fancy about the selection of particular kinds of whey. Cows’, goats’, and ewe-milk whey all have their advocates ; but goats’ milk whey has a strong smell which is distasteful to many ; the cows’ milk has no unpleasant odour or flavour, while ewe-milk has no disagreeable smell, and its taste is very pleasant ; it is decidedly the nicest to take of the wheys. We are often told of the aromatic flavour imparted by the herbs that the animals have grazed on, but such flavour is always lost in the preparation of whey. Then it is asserted that the rennet, or prepared piece of stomach employed in making the whey, must be got from that of an animal of the same species ; for instance, that you cannot get good goats’ whey if you use the rennet of calf. Then in various places different herbs are employed in imparting flavour to the whey. There is a general feeling in favour of Swiss whey ; and if they are

not in Switzerland, patients are gratified to learn that the whey is made by a native of Appenzell, and still better pleased, if the said native shows himself in his national costume.

The general composition of whey has been given above, but particular kinds are thought to be most useful in different complaints ; thus, goat-milk whey is considered best in chest affections, cows' milk for abdominal ailments, and ewe-milk as most generally nourishing : but these rules are often as arbitrary as the distinction between the mineral waters of the same place, when they scarcely vary at all in composition.

Whey (the main therapeutic value of which is probably as a nutritive drink) is recommended theoretically, as supplying to the blood only non-nitrogenous elements, the nitrogenous casein and the fat being excluded ; the notion is, that the constitution of the fluids and tissues of the body is altered and improved by the salts and milk-sugar which it contains, while the nitrogenous elements are withheld. But these theoretical ideas are of no real importance, as long as all patients drinking whey at the same time use a diet in which there is an abundance of nitrogenous or protein substances ; some have attributed special virtues to the small quantity of the salts of potass present in whey.

The whey cure is recommended in chronic bronchial and laryngeal catarrhs, in tuberculosis and hæmoptysis, in chronic catarrh of the stomach, in congestion of the liver, and in hæmorrhoids.

In the first of these affections we have already seen, that warm water is a useful remedy, and it is probably

to the whey being drunk warm, that its good effects are to be attributed.

In pulmonary phthisis it is for its more erethic, excitable form, in which inflammation occurs from time to time, and active hæmorrhage, that the whey cure is recommended. In most cases the operation of whey may be considered mildly antecatarrhal and antiphlogistic. But for the more torpid forms of consumption it is not adapted; and where there is much acidity present, as in some forms of incipient phthisis, and still more when there is diarrhœa, the whey is contra-indicated.

In abdominal affections, whey acts chiefly as giving hardly any work to the digestive organs to do, and as a mild aperient; but it is apt to cause dyspepsia and diarrhœa. While it has many advocates for its use in hæmorrhoids and abdominal obstructions, the general voice is against its employment in catarrhs of the stomach or in perforating ulcer.

Whey, on the whole, is by no means the mild remedy that it is usually supposed to be; its continued use is often very lowering; at the same time there is no question, that many people thrive on it and on mountain air.

If milk, a natural product, easily causes indigestion, and is not suited to be singly the food of adult man, much less is the artificial product whey fitted to be so. Adults going through a milk cure, use ordinary articles of diet; in a whey cure they must do it, or would suffer excessively in their nutrition. Useful, therefore, though milk may be under many circumstances, and whey occasionally, most of the

success claimed for systematic milk and whey cures may be very fairly set down to change of mode of living, to great simplicity of diet, to exercise in the open air at the best season of the year, and to the pure air of Alpine elevations.

Milk and whey cures are to be obtained almost everywhere : but for the English, *Ems*, *Schlangenbad*, and *Badenweiler* may be recommended in the Low country ; *Ischl*, *Reichenhall*, and *Kreuth*, in the Eastern Alps ; *Gais*, *Weissbad*, *Heiden*, or *Interlachen*, in Switzerland.

The supply of whey at most baths is abundant, and there are few places where a great many of the patients, particularly ladies, are not directed to drink the waters mixed with whey. Whey by itself is mawkish, and these mixtures appear to me to be singularly disagreeable to take, and therefore not particularly suitable for delicate stomachs. I myself have no doubt that a milk cure would at most of these places be more efficacious than a whey one.

I do not see why we should not have ewe-milk whey cures in Great Britain, especially in some parts of Scotland, although I believe regular systematic whey cures are less popular in Germany and in Switzerland at present, than they used to be.

The mode of life at Gais, the oldest of the Swiss whey cures, is thus described :—"At six o'clock in the morning the bell rings to let people know that the whey has arrived. A tub of whey is set down before each hotel, from which the kellner fills up the glasses of the guests, which contain one to three choppins. Whoever comes too late, has to wait for

the next supply, as the whey must be drunk warm ; however, he can never have to wait long, as the bell sounds every quarter of an hour up to half-past seven or eight o'clock, announcing the arrival of fresh relays. In the intervals of drinking, the patient walks about. When a patient has drunk the quantity directed, he takes a longer walk. In bad weather the whey is drunk in the *Kursaal*. The bell calls to breakfast at nine o'clock, which consists of soup, coffee, or tea and bread. From half-past six to half-past twelve the guests amuse themselves with walking, with conversation, music, or billiards. About half-past twelve dinner commences, when patients must eat according to the directions they receive, but the table is ample and varied. After dinner come longer walks, and at eight o'clock the bell rings for supper."

Patients begin with one glass, and go up to three or four glasses. If the whey is taken in larger quantities, the stomach is oppressed, and sometimes headache and giddiness are occasioned. On this account, patients with delicate stomachs should commence with very small quantities, less than half a glass. The drinking successive glasses rapidly after each other is to be avoided. If diarrhoea is the result, the quantity drunk is to be reduced ; if constipation occurs, any of the bitter waters may be used, in small quantity, at bed-time. Loss of appetite, weariness, and other effects somewhat resembling the saturation by mineral waters sometimes occur, and for this the doctor must be consulted.

Cows' milk, goats' milk, and ewe-milk whey are given in different places ; many do not like goats' milk whey ; on the

whole, the cow-milk is best borne. Ewe-milk whey contains about two per cent. of albuminates, cows' and goats' about one per cent.

The most favourable season for the whey cure is spring ; but the season varies much according to the elevation of the station.

The duration of a whey cure is very various. If the digestion does not suffer, it may be prolonged ; and if it really be effective in tuberculosis, it is evidently only from long-continued courses of it that much beneficial alteration in the nutrition of the system can be expected. It is not uncommon to drink the whey in spring, then stop during summer, and have a second course in autumn.

Butter-milk has been much used in diseases of the stomach, and in perforating ulcer, and is applicable where milk can be better supported by the stomach without its cream. For such cases it is suited ; but even practical men have at times become enthusiastic about its virtues, and recommended it in hysteric catalepsy and spinal irritation !

Cream may in a certain number of cases be found useful in producing improved nutrition in the same way as cod-liver oil ; but many stomachs cannot bear it. I have known an attack of extreme violence, and resembling Asiatic cholera, follow the swallowing of too large a quantity of it.

Sour Milk.—It is well known that milk, if left exposed to the air, soon turns sour and coagulates. This is believed to depend partly on the formation of minute fungi, of bacterias and of vibrios, and partly on the conversion of milk-sugar into lactic acid. The souring is readily caused by changes

of temperature and atmospherical influences ; nay, even the vessel in which the milk is kept, seems to have a wonderful influence on the process.

When milk has soured, its casein and lactic acid do not appear to interfere with digestion ; indeed, many writers, particularly some Vienna ones, have of late thought it more easily digested than fresh milk. Sweet milk, when it enters the stomach, has its casein coagulated and then redissolved ; and it is the opinion of many, that the casein which has coagulated, exposed to atmospherical influences, is more easily dissolved again than the other.

It is chiefly in disorders of the digestive organs that the superiority of sour milk is maintained. There seems to be no doubt that casein is easily digested by most stomachs. One of its forms is known in Scotland as Corstorphine Cream. Sour or curdled milk, under the name of Dahi, is a popular article of diet, indeed of medicinal regimen, among the natives of India. They also preserve it dry and powdered, and in the East generally it is often prepared mixed with flour.

Koumis, another result of the decomposition of milk, is a sort of spirit procured by the Tartars from the fermentation of mares' milk, no doubt mainly from the transmutation of the milk-sugar.

It is much used by them as a strengthening article of diet, and of late years it has attracted some notice in Europe as a tonic remedy. It is considered a great restorative in depressed states of the system, and, combined with the fresh air of the steppes, is believed to be just as efficacious as

whey supported by an Alpine climate ; but it requires to be used in large quantities indeed to be the chief article of diet.

I should not have thought it necessary to allude to the koumis here, had not some attempts been made to introduce it into Europe. Besides being used in various Russian towns, it has been employed at Bremerhaven, at Salzbrunn, at Görbersdorf in Germany, and at Eaux-Bonnes in the Pyrenees. Its employment appears to be making some progress.

SYNOPSIS.

I.—*Digestive and Abdominal Organs.*

THE affections of these organs form the commonest subject for treatment by mineral waters, and are therefore mentioned at greatest length in this synopsis.

Chronic *pharyngitis* may require local treatment, but is mainly a symptom of altered conditions of the intestinal canal, and therefore is not to be treated independently of them.

Dyspepsia.—Almost every form of it will improve for a time by change of air, scene, and diet. Atonic dyspepsia is best treated by chloride of sodium, carbonic acid, and cold springs generally, as by Kissingen, Homburg, and Soden; by pure chalybeates, as Spa, Schwalbach, Orezza, and Tunbridge Wells; at sulphur wells, as mild Harrogate; some of the acidulous waters, as Fachingen, Soultzmatt, Roisdorf, and Heppingen, to be used as table waters. Also by hydropathy; sea-bathing. Where there is excess of acid, more alkaline springs, as Vals, Vichy, Ems, Neuenahr, and Gleichenberg; or iron combined with soda, as Wildungen or Heilbrunnen.

Where there is sluggishness of the bowels, Karlsbad, Marienbad, Tarasp, Harrogate ; or, if iron is wanted, Franzensbad, Elster, Rippoldsau.

The nervous forms and the enteric ones are often not easily distinguished from stomachic neuralgia. Chiefly warm waters in the first place, as Karlsbad or Vichy ; then the whole class of indifferent waters, as Plombières, Bains de Bigorres, Nérís, Bath ; or weak warm salt waters, as Wiesbaden or Bourbonne ; or alkaline, as Ems ; or some of the warm sulphur, as Cauterets and other Pyrenean baths, or Aix-la-Chapelle.

The more acute form of mucous catarrh is to be treated by regulation of diet and drinks, and is generally best treated by warm and alkaline carbonated springs in the first instance, and afterwards by iron.

For chronic *ulcers of the stomach*, there is no well cure. Small doses of the weaker warm waters, as Ems, may be of some service, or the milk cure.

Carcinoma can at most receive a little relief from some of the carbonated waters.

It is curious, but nevertheless the fact, that the same treatment is often applicable to habitual costiveness and to chronic diarrhœa of the milder forms.

Habitual *costiveness* may be relieved by the use of the more powerful purgative waters, such as Püllna, Suidschütz, Friederichshall, Birmerstorf, Ofen ; Friederichshall being perhaps the best for continued use. They are drunk at home.

To rouse the abdominal viscera generally, we have the continued use of Glauber salt waters, such as Karlsbad,

Marienbad, Franzensbad, Elster, Cheltenham, Leamington ; or salt waters, as Kissingen, Homburg, Harrogate, which contains sulphur.

Iron waters, assisted with purgatives, are useful when there is defective innervation.

Hydropathy is often useful.

Diarrhœa, if of a kind for mineral waters, to be treated chiefly by small doses of warm alkaline or saline waters, such as Vichy, Ems, Neuenahr, Karlsbad, or Wiesbaden, in small doses ; also small quantities of cold springs, as Homburg or Kissingen ; or of iron, as Spa ; some of the earthy wells, as Lucca, Bath, Plombières ; also hydropathy—but this last is doubtful.

Chronic *dysentery*, like the worst forms of *diarrhœa*, can scarcely gain much from mineral waters, but what has been said above of *diarrhœa* will apply to *dysentery*. Injections of the warm mild alkaline waters I should suggest as likely to be useful.

For *helminthians* or *worms*, any of the more purgative waters may be tried, or especially some of those containing sulphuretted hydrogen ; the more disagreeable ones, such as Harrogate, Uriage, or St. Gervais ; or sea-water, or some of the brines. Also, for *ascarides*, large injections of salt waters.

Under the head of obstruction of the portal system come what the Germans call *abdominal plethora*, and *hæmorrhoids*, and, indeed, the affections of the *liver* generally. The treatment may be by purgative or saline waters, such as Said-schütz, Friederichshall, Karlsbad, Marienbad, Tarasp, or the

milder Kissingen, Homburg, Soden, Wiesbaden, Canstadt ; by alkaline saline waters, as Franzensbad, Elster, Rippoldsau, Petersthal ; sulphur waters, as Weilbach, Nenndorf, Eilsen, Harrogate, Llandridnod, Lisdunvarna, Moffatt, Strathpeffer. Whey and grape cures, when pushed to some extent ; Banting, and other varieties of diet cure, may help.

Congested liver, with or without enlargement, is treated most advantageously by such waters as those of Karlsbad, Marienbad, and Tarasp. The same effects may be produced by Kissingen or Homburg, or weaker salt waters.

Some cases profit by Vichy ; many by the purgative action of Harrogate, Cheltenham, or Leamington. A certain number are benefited by sulphur waters, but rarely, unless they contain some salts.

Cirrhosis, in its early stage, before the constitution begins to break, may be treated, but with care, as congestion. The salt wells containing traces of iodine are thought useful ; in a later stage some chalybeate wells may be tried.

Fatty liver in the strong may be treated by Karlsbad or Marienbad, Elster, or Vichy. If there is a scrofulous diathesis, or when the patient becomes weak and anæmic, chalybeates are indicated.

Amyloid or waxy liver.—Similar treatment may be attempted, but it must not be at all active.

Icterus and *catarrh* of the *gall ducts* are treated successfully by alkaline and alkalo-saline waters, such as Vichy, Karlsbad, Elster, and also Kissingen or Homburg ; but warm bathing is an important adjunct.

Gall stones.—Much the same treatment. Vichy and Karls-

bad have undoubtedly been most efficacious, and claims are put in for Tarasp and Neuenahr.

Chronic enlargement of the *spleen* usually disappears, when the intermittent fever with which it is associated has been cured. The object is more to improve the general health. The water selected must depend much on the strength of the patient. For such as will bear pretty active treatment, Karlsbad, Marienbad, Tarasp ; for less robust, Kissingen, Homburg ; or iron waters, Franzensbad, Elster, Pyrmont, Spa. In France, some of the arsenical waters are recommended, as Cransac, La Bourboule, also Orezza and Bourbonne. Mud baths, local douching, strong brines, may all find their appropriate employment.

II.—*Affections of the Respiratory and Circulatory Organs.*

The English do not attach much importance to mineral waters in affections of the lungs ; abroad they think more of them. As regards treatment, chronic *laryngitis*, whether simple or tubercular, *bronchitis*, and early *phthisis*, are alike. In all of them there is the question whether it is the more torpid or the erethic form that is to be treated, or what is the stage of the disease, and whether the waters are considered sedative or exciting. Ems, Gleichenberg, Lipp-springe, Soden, Weissenburg, are specimens of the former ; Eaux-Bonnes, Cauterets, Mont Dore, Enghien, and some of the chalybeates, of the latter.

All these forms of disease are treated with the exported weaker alkaline waters, and with inhalations of gases and

pulverized waters, the sulphuretted waters being the most commonly employed for this purpose.

Pleuritic exudations are treated at such places as Ems, or Soden, or St. Nectaire.

Asthma and *chronic emphysema* are practically treated as chronic bronchitis. Caunterets and Mont Dore have a certain repute. Change of air often does good, and compressed air is worth trying. In nervous forms waters are of little use.

Various climates and changes of diet as applied to these affections have been already described.

In affections of the *heart*, much cannot be expected from waters ; but patients whose condition is plethoric or fatty, may be treated with care at the Bohemian baths. Some of the warm salt waters, as Nauheim, Wiesbaden, and Bourbonne, may be of use in pericardial adhesions; and in palpitation connected with chlorosis, Spa, Schwalbach, or Pyrmont.

Angina pectoris, which is probably a nervous affection mainly, is best treated by change to the sea-side or to the mountains : mild treatment with saline or weak alkalo-saline waters, not too highly carbonated, when there is torpor of the abdominal organs. Hot baths are to be avoided. Iron springs may be useful.

III.—*Affections of the Nervous System.*

Tendency to hyperæmia of the brain and to *apoplexy* may be combated by the ordinary treatment for plethora, by the Glauber salts and stronger common salt-wells that do not contain too much carbonic acid. When there is no great hyperæmia, the weaker salt baths are indicated.

Baths are useful, especially if they be not too hot, or contain too much carbonic acid ; so is the cold-water cure and dry rubbing.

Affections of the *spinal cord* are chiefly treated by the indifferent baths at Teplitz, Wildbad, Gastein, or with salt waters with carbonic acid, as Rehme or Nauheim ; or by mild cold-water treatment.

Paralysis is chiefly treated also by the indifferent baths ; cases with anæsthesia are more hopeful than those with hyperæsthesia. When no muscular contraction is produced by electricity, there is little hope. Local douches, especially the Ecossaie, are of use in this as in the last.

Effects of *Apoplexy*.—The tendency at present is to submit them to pretty active thermal treatment at as early a period as possible, whether at Teplitz, Balaruc, Bourbonne, or Mont Dore ; such treatment might be pursued at Bath. Many disapprove of this.

Rheumatic or *gouty loss of power* must be treated mainly like gout or rheumatism, chiefly by baths of high temperature, and almost any will answer for this purpose. Mud and vapour baths come into play, especially in old cases.

If *hysterical*, the treatment is partly that of chlorosis : mud baths, the cooler salt baths, sea-bathing, shower baths, may help.

After *confinements* or *exhausting illnesses*, steel baths and indifferent ones, along with the internal use of chalybeates.

In *neuralgias* it is often necessary to go through the round of treatment. If there be anæmia, chalybeates internally are wanted. Warm indifferent waters, as Nérís, Plombières,

Ragatz, Teplitz, Wildbad, are much used ; hot salt baths, sulphur ones, and steel ones may all have to be tried.

Hyperæsthesia may be treated by indifferent baths, mud baths, pine, or *kräuter* ones. Mountain and dry air are often useful, as in neuralgia ; St. Moritz, and other summer resorts.

Epilepsy is not satisfactorily treated by mineral waters, and *chorea* only so far as general treatment and improving the health goes. Sea-bathing may be tried with care.

Hysteria.—Its treatment is much the same as that of hysterical paralysis. It is mainly treated by the chalybeates and saline chalybeates internally, and by baths of not too high a temperature. Mild hydropathic procedure may be of use. Treatment must vary according to the state of the uterine system.

Hypochondriasis.—The treatment mentioned for dyspepsia and for abdominal congestion will suit the common forms of hypochondriasis; when there is anæmia or neuralgic tendency, the iron springs. The cold-water cure may answer. Temporary benefit is generally got from a visit to almost any spa. The crowded season of a bath suits the depressed better than the excitable hypochondriacs ; that is, the majority of them.

IV.—*Affections of Urinary Organs.*

Chronic *albuminuria* and Bright's disease admit of much the same treatment. If commencing, they may be treated by the milder carbonated alkaline springs, as Bilin and Fachingen, drunk in considerable quantities ; Karlsbad, or Vichy, or Vals, in small quantities, with great caution ; protracted warm baths. For more advanced stages, iron waters,

Wildungen or Heilbrunnen, improved general conditions of life, regulated diet, warm winter climates.

Gravel.—This diathesis is treated as lithic or phosphatic. The lithic is most commonly treated with alkaline waters, as Vichy, Vals, Bilin ; or, with more hope of altering the diathesis through the alimentary canal, by alkalo-saline, as Karlsbad, or alkaline-salt, as Ems. For phosphates, earthy waters and simple table ones are most used—Wildungen, Wiesenquelle, at Marienbad. Wildungen is in special favour.

Are any lithia waters, as Mur or Vals, strong enough to act as solvents, or have minute quantities of boracic acid any such power? I fear not.

Chronic Catarrh of Bladder.—Treatment essentially the same as that of phosphatic gravel : alkaline, and alkalo-saline, and alkaline salt, also weak iron and some earthy and indifferent waters ; the weaker alkaline waters, as Contrexeville, Vittel, Pougues, Bath ; free drinking of indifferent warm waters ; hot baths.

Affections of *male generative organs* require constitutional treatment. No doubt indifferent baths, hydropathy, and local applications of cold are of some use in spermatorrhœa. Apparently carbonic acid locally applied causes stimulation.

V.—*Affections of Female Sexual System.*

Disordered Menstruation.—The same classes of waters are often efficacious, if judiciously employed, in the three forms of amenorrhœa, menorrhagia, and dysmenorrhœa. The chief waters are the iron carbonated ones, Spa, Schwal-

bach, Pyrmont, and Rippoldsau, and a host of others ; steel baths, sea-bathing. Their use must be varied.

In *amenorrhœa*, and still more in *dysmenorrhœa*, the warmer waters are indicated, and many of the indifferent ones are efficacious with their various local applications, especially when there is neuralgic suffering.

In chronic *metritis*, with infiltration or induration. In such cases the more active agency of Glauber salts and common salt may be required—Marienbad, Franzensbad, Karlsbad ; or salt waters, as Kissingen, Homburg, Soden, Kreuznach, Krankenheil ; stronger salt baths, professing to contain iodine, steel baths, mud baths, salt baths. In a later stage, iron waters, particularly such as are slightly purgative, as Rippoldsau and the Black Forest group. When there is neuralgic pain, recourse may be had to the thermal indifferent baths, those of the Pyrenees, Bagnères de Bigorres, Nérès, Plombières, Ragatz.

Chronic *vaginal catarrh* is essentially to be treated in the same way constitutionally, but local treatment is not to be overlooked, and is practised with almost all thermal waters.

Ovarian disease, or fibroid tumour, in their early stage are mainly treated at some of the strong salt baths, where they have been made a specialty of. Kreuznach is the best known of such sources, especially to the English. Considerable improvement may occur in the last.

Sterility.—The cure can only be indirect. The most famous baths, those which have maintained their reputation for centuries, have been indifferent or earthy thermals—Pisa, Bormio, Baden in Switzerland, Liebenzell, Schlangenbad,

Bagnères de Bigorres, Bath, Buxton. Iron waters—any of those already enumerated ; alkaline waters, with much carbonic acid, as Ischia, Ems, St. Nectaire. This last class is probably highest in public opinion at present, and is especially employed locally.

VI.—*Constitutional Affections.*

Anæmia and *Chlorosis* may be classed together in their treatment, though the one is more usually the consequence of some illness or of paludal poisoning—the latter more connected with the development of girls. The treatment is essentially by iron and carbonic acid, or by salt and carbonic acid waters, used externally and internally : Spa, Schwalbach, Pyrmont, St. Moritz, La Bauche, Marienbad, Franzensbad, Elster ; some of the salt springs with iron in them, as St. Nectaire, Royat, Homburg, Kissingen, Soden. Steel baths, as they are called, sea-bathing, mud baths, and pine extract are useful adjuncts ; travelling and change of scene and climate.

Scorbutic conditions are to be treated in the same way, so far as mineral waters are concerned.

Scrofula is usually divided into torpid and erethic. For the torpid forms, and when deposits have taken place, salt baths, as Kreuznach, Nauheim, Rehme, Ischl, Reichenhall, are to be preferred ; and springs supposed to contain iodine are resorted to, as Krankenheil, Halle ; Challes water is drunk ; when bones are diseased, sulphur water, as Barèges, Luchon. In erethic forms, alkaline waters, Ems ; salt,

Homburg, Kissingen, Soden. Torpid cases are considered to benefit much by mountain air ; erethic ones by sea-side. In either form, when there is much weakness or pallor, iron wells, especially some earthy ones, as Wildungen.

Syphilis.—Various mineral waters, especially sulphur ones, are useful as tests of the presence of syphilis in the system, and as adjuncts to other treatment, which is almost always found to be necessary. Some of the best known are Aix-la-Chapelle, Schinznach, some of the Pyrenean baths. Spain is the only country where they now ascribe direct curative effects to some of their waters.

Mercurialism and lead-poisoning.—All warm baths help, but sulphur ones are believed to do so specially, the sulphur being supposed to form salts with the mercury or lead in the system, which are soluble, and are eliminated from the economy. Baths containing iodine are not strong enough, unless reinforced artificially, but are believed to be useful.

Diabetes.—Alkaline springs have undoubtedly a modifying influence over this condition—many believe a curative one—as Vichy, Karlsbad, Neuenahr. Hot and vapour baths, warmer climates, especially in winter.

Rachitis.—Most of what has been said of scrofula applies to this condition also. Lime can be supplied in most of the earthy waters, but no phosphates. The treatment is to do everything to improve the general health.

Progressive muscular atrophy.—There is little to be done. You may try warm sulphur baths. They will do no harm.

Rheumatism.—All waters profess to cure it. The treatment is mainly by hot indifferent or sulphur waters, such

as Bath, Teplitz, Plombières, Aix-la-Chapelle, Aix, Savoy. The condition of the heart is to be borne in mind. When there is thickening of the joints, the springs of high temperature, mud baths—Aix-les-Bains, Bourbonne, Kreuznach, Nauheim ; when rheumatism has caused deformity of hands or feet, baths will do little ; when there is much neuralgia, indifferent baths, as Nérís, Ragatz, Wildbad.

Gout.—For the strong, and in recent cases, alkaline and saline alkaline, as Vichy or Karlsbad ; for tolerably strong patients, especially with disorder of digestion, Wiesbaden, Baden-Baden, Bourbonne, Ems, and Neuenahr ; in older cases, and when patients are asthenic, Teplitz, Wildbad, Bath, Buxton, and a whole host of similar wells, a sufficient quantity of water being drunk to act on the kidneys. No baths can resolve *tophi*.

Wells with lithia, as the Murquelle and Baden-Baden, are sometimes recommended. Vapour baths and Russian baths may be useful, duly proportioned to the case, and when there is not great debility.

VII.—*Skin Diseases.*

It is difficult to lay down more than a few generalities. If you take the French, indeed the more philosophical view of the subject, you must treat skin affections according to their constitutional basis, which may be scrofulous, rheumatic, herpetic, or syphilitic. A simpler and more practical division is into dry and moist eruptions.

Almost all chronic skin complaints may profit by luke-

warm baths ; eczemas and eruptions with much irritation bear colder waters. Scaly forms gain most by the hotter and more prolonged baths, by mud baths, and poultices.

As a general rule the very strong salt baths are to be avoided, and most is gained in skin complaints by the use of the indifferent or nearly indifferent baths—and sulphur and most earthy waters are practically indifferent ones.

The internal use of waters must depend still more on the constitutional view taken of the case, but any water which improves the general health, tends so far to the cure of cutaneous affections. Thus chalybeates, as Tunbridge, may aid.

All sulphur waters, especially those of Aix-la-Chapelle, Schinznach, Uriage, St. Gervais, and almost all the Pyrenean baths, as well as the stronger cold sulphur waters, such as those of Harrogate, are commonly believed to have a specific action in skin diseases.

Earthy waters, as Leuk, Bormio, and Bath ; indifferent ones, as Teplitz and Schlangenbad ; alkaline, as Vichy or Ems, all find employment. The French believe that some of their arsenical waters, as La Bourboule, have a specific action. Practical men can scarcely credit this.

VII.—*Organs of Sense and Surgical Cases.*

Affections of the eyes may be benefited by modifying various conditions on which they may be dependent, such as anæmia, abdominal congestions, scrofula. They are occasionally treated locally by douches of mineral waters, as at St. Nectaire and St. Christau, or by douches of carbonic acid gas.

Affections of the *nose* and of the *ear*, especially when they are dependent on scrofula, may profit much by some of the salt baths. Local applications are also useful, and injections into the nose. Douches of carbonic acid gas have been applied in deafness, but not with much benefit.

Old wounds, caries of bone, and anchyloses are all treated with the hottest waters. Barèges in France, and Teplitz in Germany, may be looked on as types of this treatment. In caries of bone, Barèges has maintained now for a very long period the highest reputation. There is no question that such waters often produce effects which in ordinary surgery would be reckoned very surprising. In cases complicated with scrofula, the salt waters are important aids.

I have now presented an outline of a portion of the varied remedies which Nature has spread before us. I say a portion, for, in the words of Pliny the natural historian, "What mortal is able to enumerate all waters?"

SUPPLEMENTARY NOTE.

*(Lippspringe and Inselbad were omitted in Book II.
Chap. II.)*

Lippspringe, in Westphalia, five miles from Paderborn on the railway, has risen into great reputation in affections of the chest, notwithstanding its northern position, and that its climate is rather damp and not particularly mild, though tolerably equable.

The chief well contains about 16 parts of lime and insoluble salts, 8 of sulphate of soda, and a fair quantity of carbonic and of nitrogen gases. One to three glasses of the water are drunk in the morning, and if necessary one or two in the afternoon. Baths are used as an auxiliary, and also inhalations of nitrogen. There are comfortable arrangements for visitors, and walks in the park. Living is moderate.

Close to Paderborn are the baths of *Inselbad*, which are still richer in nitrogen, and also used for inhalation. Cases of consumption in their early stage are said to benefit much by the use of tepid baths, inhalations, and the drinking of these weak lime waters. How at either place such effects are produced it is difficult to explain, but it seems

to be impossible to dispute their reality. Dr. Rohden, like most others in these days, believes that in the inhalations, the aqueous vapour is more important than the nitrogen.

[The Prussians destroyed the establishment at Plessis Lalande (p. 74).

At Ladakh should be *in* Ladakh (p. 35).

As already said, the quantities of the mineral constituents given in this work are parts in the 10,000. If in any instance the conversion of the grains used in the first, has not been made in this edition, it may be well to remember, that the grains or inches refer to their number in the pint.]

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